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RECENT DEVELOPMENTS IN THE TREATMENT OF AMOEBIASIS.

By Philip MANSON-BAHR, D.S.O., M.D., F.R.C.P., D.T.M. & H. Cantab.,

Sectional Editor, Tropical Diseases Bureau.

In this résumé an attempt has been made to collate the more recent methods of treatment for amoebiasis. The variety of methods may be taken as an index of the uncertainty that still exists regarding the mode of action of the alkaloids of ipecacuanha upon the *Entamoeba histolytica*. ROGERS, in his original experiments, concluded that emetine exerted a direct action upon the parasite, whilst DALE and DOBELL, from their experiments on *E. histolytica* infection in kittens, regarded the failure of emetine to eradicate the infection in these animals as indicating that the drug acted, not directly upon the entamoebae, but in some unascertained manner upon the host itself. Research has consequently been undertaken in other directions with a view to the discovery of a more efficient drug. In future, however, the exact mode of action of these various agents will doubtless be determined by experiments in vitro with artificial cultures of *Entamoeba histolytica* itself according to the successful method so recently elaborated by BOECK and DRBOHLAV.

REFERENCES.*

DALE (H. H.) & DOBELL (C.) xi, 248.
DRBOHLAV (J.) *Trans. Roy. Soc. Trop. Med. & Hyg.*, 1924, xviii, 238–240.

I. INTESTINAL AMOEBIASIS.

Emetine.—As stated in the last critical review on dysentery (Vol. 18, p. 321), emetine injections, uncombined with other treatment, appear to be insufficient to eradicate an amoebic infection from the bowel, though undoubtedly they are of very great value in the acute stage of the disease. The maximum number of injections, according to JEPPS, should not exceed 12 of 1 gr. each on consecutive days, or symptoms of emetine intoxication are apt to ensue. VACCAREZZA is of the opinion that failure with emetine is usually due, either to the

* References throughout are to the summaries in this *Bulletin* unless otherwise stated.

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employment of too small a dose, or to the cessation of treatment immediately the symptoms disappear: treatment should be commenced early, carried out intensively and systematically repeated; the maximum dosage he employs is 0·15 gm. (or 2½ gr.) daily for not more than four days; or 0·10 gm. (1½ gr.) for not more than seven days. CONNOR appears to have had exceptional success with the emetine treatment carried out as follows in Ancon Hospital from 1914–1918: After a preliminary purge with castor oil, large doses of bismuth subnitrate are exhibited to check the diarrhoea; emetine is then given in four treatments, three to five days apart in severe, less frequently in mild, infections. The customary dose is 1 gr.; the average per patient 8–10 gr. More than 100 cases of amoebic dysentery have thus been successfully treated since 1914. CAWSTON suggests that the pain commonly caused by emetine injections can be avoided by intramuscular administration and by dissolving the alkaloid in 1 per cent. carbolic acid immediately before injection. SELLARDS and LEIVA have ascertained that in kittens emetine injections do not prevent the subsequent development of amoebic dysentery, and that relatively much larger doses are requisite in cats than are necessary in man. In these animals, however, emetine injected in solution into the rectum is more efficacious than given subcutaneously. The dosage for cats by the rectal route is 10 mgm. per kilo and the drug is given in 1 : 1,000 solution.

Acting on this suggestion, WILLMORE supplements oral administration of emetine by medication *per rectum*. Emetine base 1 gr. is mixed with ether (6ʒ) and olive oil (8ʒ) and, after a preliminary washout, injected slowly into the bowel; the patient being retained in a position as much "inverted" as possible. These injections are given on alternate days, 6–12 completing a course which should be controlled by sigmoidoscopic examination. [According to the reviewer's experience, emetine injections *per rectum* in man are extremely irritating and painful. When given in a dilution of 1 : 2,000 (2½ gr. emetine in 12 ozs. of water) they produce intense intestinal spasm which may last 4–6 hours, and in 2 cases under his care have actually kindled an acute attack in chronic infections. In a third case, however, when given twice weekly for 3 weeks on end, a favourable result was obtained, the patient having remained free from relapses ever since—*i.e.*, a year from cessation of treatment.]

Intravenous injection of emetine, though discountenanced by SELLARDS and LEIVA, is advocated by PETZETAKIS, who gives gradually increasing doses commencing with 0·03 gm. up to a maximum of 0·1 gm. (1½ gr.), making a total of 0·35–0·45 gm. (7 gr.) within 10 days, and reports rapid and striking results, superior to the intramuscular or subcutaneous methods usually employed. As may be surmised, and as BENSAUDE, CAIN and RACHET have shown, intravenous injections of emetine are apt to be followed by nausea and vomiting, which may supervene ¼–1 hour after the injection. Delayed toxic symptoms, due to the cumulative action of the drug, manifest themselves in asthenia, polyneuritis and cardiac complications.

REFERENCES.

Emetine.—JEPPS (M. W.) xix, 30; VACCAREZZA (R. F.) xix, 30; CONNOR (R. C.) xix, 327; CAWSTON (F. G.) xx, 112; SELLARDS (A. W.) & LEIVA (L.) xxii, 9.

Intravenous.—PETZETAKIS, xxi, 342 & xxii, 6; BENSAUDE, CAIN & RACHET, xxi, 686.

Lavage.—SELLARDS (A. W.) & LEIVA (L.) xx, 402. WILLMORE (J. G.) xx, 708.

Ipecacuanha compounds.—Le Noir and de Fossey find Ravaut's paste combined with intravenous injections of salvarsan (0·3 gm.) gives "very favourable results." The treatment is continued for 12 days, Ravaut's paste being given alternately.* Willmore considers that it is a useful adjunct, but has no real curative value. Roux advocates hypodermic injection of total ipecacuanha—powdered ipecacuanha put up in ampoules containing 20 cgm. to every cc. of liquid; in severe cases two injections are given daily.

References.

Ipecacuanha and Compounds.—Le Noir & de Fossey (M.) xix, 688; Roux (F.) xxi, 28.

Emetine bismuthous iodide and Emetine periodide.—The efficacy of E.B.I. in eradicating chronic amoebic infections appears to have been definitely proved, though there is undoubtedly a residuum of resistant cases. In these, of which the reviewer has had many examples, little seems to be gained by persisting in the drug after it has had a thorough trial. Many practitioners are deterred from giving E.B.I. because of the unpleasant symptoms which are apt to follow. Methods which have been devised with a view to obviate its therapeutic defects often appear to result in non-absorption of the drug. Thus Jepps finds that salol-coated pills of E.B.I. are unsatisfactory; over 45 per cent. of her cases relapsed after such a course of treatment. Liquid paraffin makes an excellent excipient, 3 gr. being dissolved in half-an-ounce of liquid paraffin. If dropped into a glass containing two to three ounces of water the dose is easily taken. Given by this method unpleasant sequelae followed only in 10 instances in 75 cases treated, and only 12·7 per cent. out of a large series relapsed after a course of 36 grains. Rennie reporting upon the cases of intestinal amoebiasis treated at the Hospital for Tropical Diseases, London, concludes that the best form of exhibiting E.B.I. is as a loose powder in gelatin capsules.† Three of these, each containing 1 gr. of E.B.I., are given on empty stomach last thing at night. Should the patient be intolerant, 10 minims of tinct. opii are given half-an-hour beforehand. The patient must be in bed, the diet light and easily assimilable and not necessarily restricted to milk. Delayed vomiting (four hours after ingestion) does not indicate non-absorption, but rather that the drug is having therapeutic effect. Diarrhoea occurring during an E.B.I. course should be regarded as similarly indicative; as a rule three or four dark fluid motions should be passed daily. Restriction in diet for a month subsequent to treatment is advisable. Most patients lose weight during the course of treatment, but rapidly regain it after. Martindale points out that, contrary to accepted opinion, E.B.I. is soluble in the acid of the gastric juice with the liberation of emetine in solution. Willmore has adopted the practice of administering 60 gr. of emetine-bismuth-iodide during 20 days, and in the same period injecting 10 gr. of emetine. Of 358 cases thus treated, 28 per cent. were cured after the first course; 20 per cent. after a second course; and 5 per cent. after a third course. 100 per cent. of those receiving more than 3 courses relapsed. From these figures Willmore concludes that neither emetine nor emetine-bismuth-

* Powdered charcoal, powdered subnitrate of bismuth, syrup, glycerin, of each 100 gm. Powdered ipecacuanha, 4 gm.

† The E.B.I. is manufactured by Messrs. Burroughs, Wellcome & Co., the gelatin capsules—size No. 2—are supplied by Parke, Davis & Co.

iodide is a specific cure, though both are valuable drugs. The worst cases to cure are those that pass from one acute relapse into another, in which encystment of *E. histolytica* does not take place. The difficulty of treating the colon by medication by the mouth is due (according to WILLMORE) to the drug having to travel 25 ft. before it can exercise its effect. Treatment by the mouth should, therefore, be supplemented by rectal enemata (see p. 260).

Emetine periodide (G_{29} H_{40} N_2 O_4 6I), prepared by MARTINDALE, contains 38·7 per cent. emetine and 61·3 per cent. iodine. It is extremely soluble in alcohol and other solvents. In contrast with E.B.I., it liberates practically no emetine in the presence of acids; but in 2 per cent. sodium bicarbonate solution the emetine is liberated. It is given in capsules in doses of 2 gr. three times daily together with 5 gr. tablets of *fel bovinum*, which is said to increase the absorption. It is regarded by WILLMORE as equal, if not superior, to E.B.I., is much less toxic, and is not liable to be followed by nausea and vomiting, nor by cardiac or muscular weakness, depression, or desquamation of the skin, as in the case of E.B.I. It may be given as an intensive 15 days' course of 90 gr., and this may be repeated after 10 days' interval. WILLMORE's cases which had proved refractory to E.B.I. reacted with this treatment. GORDON, however, has not formed an equally high opinion of this drug—out of 16 cases, 50 per cent. relapsed within one month; its administration in gelatin capsules was not satisfactory, as they frequently passed through the gut without dissolving. When given as powder mixed with milk, it did not produce vomiting.

In the reviewer's opinion E.P.I. is more easily tolerated by the patient, but is much less efficacious than is E.B.I. in getting rid of a chronic infection.

REFERENCES.

Emetine Bismuthous Iodide and Emetine Periodide.—JEPPS (M. W.) xix, 30; RENNIE (P. M.) xx, 404; MARTINDALE (W. H.) xx, 404; WILLMORE (J. G.) xx, 708; MARTINDALE (W. H.) xx, 710; GORDON (R. M.) xxi, 27.

Yatren ($C_9H_6O_4$ SNI) is a combination of 28 per cent. iodine with oxyquinoline-sulphonic acid together with a proportion of sodium bicarbonate (about 20 per cent.). Under the name of *Yatren purissimum—No. 105*—it is manufactured by the Behring Institute, Marburg-Lahn, Germany, and has been used for some time as an antiseptic. Quite recently it has been advocated as a lavage in intestinal toxaemia. It is a pale yellow powder which easily absorbs moisture and must therefore be kept dry, otherwise the sulphonic acid will combine with the soda constituent. When stirred in hot water at 80° C. it dissolves with the liberation of CO_2; sterilization by boiling is therefore not advisable. At ordinary temperatures it is soluble to the extent of 4 per cent. The iodine is in fairly firm combination and does not give a violet reaction with chloroform. Yatren is rapidly absorbed and is to a great extent excreted in the urine, where after 5 or 6 hours it can be verified by the iron perchloride test with which it gives a green colour. In amoebic dysentery Yatren is exhibited in two ways—in pill, containing 0·25 gm. (4 gr.), or cachet, containing 0·5 gm. (7½ gr.) by the mouth, in total dosage of 1 gm. (15·4 gr.) daily, or by enema of 3–5 gm. dissolved in 200 cc. of water at 80° C. An enema should not exceed 1 litre, and the solution is run into the bowel at body temperature by means of a funnel and tube. As a general rule, the

patient is able to retain it for several hours, and it is best given during the evening so as to remain in the bowel during the night.

In 1921, MÜHLENS and MENK reported the cure by Yatren of two resistant cases of amoebic dysentery which had undergone appendicostomy and caecostomy without success, and improvement in six other resistant cases. They recommend that, if ulceration of the bowel be found on sigmoidoscopic examination, enemata (5 per cent. solution) be given daily for 8–14 days, and after a week's interval be repeated for 3–7 days. During active treatment rest and strict dieting are necessary. MENK (1922) regards Yatren as a valuable adjunct to emetine and E.B.I. treatment in resistant cases and recommends a course lasting 5–6 weeks. BIRT (1923) reports on 28 cases treated in Shanghai, of which 16 were regarded as cured. He considers the best results are obtained by enema in 10 per cent. solution in quantities of 100 cc. daily. In old standing cases the injection appears to cause no inconvenience, but in the acute stage it may give rise to definite pain. BAX considers Yatren treatment superior to all other. He gives the drug in 3 gm. doses daily in cachets for 10 consecutive days, the patient remaining in bed upon a milk diet, and a second course in seven days' time. A painless diarrhoea ensues from absorption of the drug. From observations extending over a year he concluded that a permanent cure had resulted in 16 cases. Other observers—GORDON and LICHTENSTEIN—have recorded less favourable results.

REFERENCES.

Yatren.—MÜHLENS (P.) & MENK (W.) xix, 31 ; MELLO (S.) xx, 112 ; MENK (W.) xx, 112 ; BIRT (E.) xx, 405 ; KUENEN (W. A.) xx, 405 ; MENK (W.) xx, 405 ; HUPPENBAUER (K.) xx. 712 ; GORDON (R. M.) xxi, 27 ; MENK (W.) xxi, 29 ; DE LANGEN (C. D.) xxi, 29 ; LICHTENSTEIN (A.) xxi, 29 ; KOP (W. A.) xxii, 8 ; TRAVAGLINO (P. H. M.) & SOEDJONO (R. M.) xxii, 9 ; BEHRINGWERKE MITTEILUNGEN, Vol. III, YATREN IN THEORIE UND PRAXIS, 1924 (Selbsverlag der Behringwerke Marburg-Lahn) ; JACOBI (E.) *Deut. Med. Woch.*, 1924, 1, 1614 ; BAX (W. F.) *Arch. f. Schiffs- u. Trop.-Hyg.*, 1924, xxviii, 479–483.

Salvarsan.—Salvarsan and its derivatives were advocated as adjuvants to emetine treatment in the last review of this subject (see this *Bulletin*, Vol. 18, p. 322), their use being suggested by their tonic effect against the depression caused by emetine. MONTIER testifies to its value in resistant cases. He gives two capsules containing novarsenobenzol 0·05 gm. daily by the mouth, or in the form of an enema—0·3 gm. in 60 cc. of water. According to RAVAUT the treatment should extend over a period of 40 days. FRANÇON and HUTINEL think that the best results are obtained by a combination of emetine and novarsenobillon, conveniently styled by them ENV. Four injections of 0·3 gm. each are given at four days' interval, while on the three intervening days emetine is injected in gradually increasing doses of 4, 6, and 8 cgm. : the emetine is suspended and the novarsenobillon injections are continued in the same dose every four days till a series of 10 have been injected altogether.

REFERENCES.

Salvarsan.—MONTIER (F.) xx, 400 ; RAVAUT (P.) xx, 404 ; FRANÇON (F.) & HUTINEL (J.) xxi, 685.

Stovarsol.—Stovarsol (acetyl-oxy-amino-phenyl-arsinic acid), a preparation introduced by FOURNEAU (Fourneau 190), has been used on a large scale by FOURNIER in the treatment of syphilis. It is

a tasteless substance, absorbed without the production of any disagreeable phenomena, and is given by the mouth in 4 gr. tablets. Stovarsol has been reported upon mainly from French sources. It was first applied to the treatment of amoebic dysentery by MARCHOUX (1922), who found that cysts of *E. histolytica* which had persisted after a full course of emetine treatment disappeared after the exhibition of stovarsol 4 gr. twice daily; a course of 20 pills or tablets cured a case of four years' duration. In refractory cases he gives 4 gr. doses every second day for two months. Latterly, GARIN and LÉPINE, NOGUE and LEGER, and DELANOË have reported favourable results, expressing the opinion that stovarsol should be regarded merely as an adjuvant to emetine treatment, and that it does not necessarily protect against relapses. FLANDIN favours a new allied compound known as tréparsol (meta-amino-para-oxy-phenyl arsinic acid), which contains 28·75 per cent. of arsenic, as compared to 27·2 per cent. in stovarsol. It is apparently given in the same dosage. These drugs are decomposed in the intestine and eliminated in the urine.

The reviewer has lately had considerable success in two emetine-resistant cases of amoebic dysentery with stovarsol in the doses recommended above. Material improvement in the general condition of the patients was noted together with the disappearance from the faeces of *E. histolytica* cysts which had persisted after a thorough course of emetine bismuth iodide.

REFERENCES.

Stovarsol.—MARCHOUX (E.) xx, 712; NOGUE & LEGER (M.) xxi, 30; DELANOË (P.) xxi, 345; *ibid.* xxi, 678; GARIN (Ch.) & LÉPINE (P.) *Presse Méd.* 1924, xxxii, 827–929 FLANDIN (Ch.) *Bull. et Mém. Soc. Méd. des Hôpit. de Paris*, 1924, xlviii, 1628–1636; Leaflet on Stovarsol "190 Fourneau," May & Baker Ltd.

Conessine.—Conessine, an alkaloid of the formula $C_{12}H_{20}N$, is isolated from the bark and seeds of *Holarrhena antidysenterica*, a plant known as "kurchi," which, used as an infusion, has long been held in high esteem in the Hindu Materia Medica. Conessine is 50 per cent. less toxic than emetine, but has been found by BROWN to possess a strong amoebicidal action. Kurchi bark tablets (gr. xx–xxx per diem) appear to exert an inhibitory action upon the *Entamoeba histolytica*, thereby minimizing the liability to relapse in amoebic dysentery.

REFERENCES.

Conessine.—BROWN (H. C.) xix, 690; HENRY (T. A.) & BROWN (H. C.) xxi, 701.

Extracts of the Simarubaceae.—The reported amoebicidal action of "chaparro amargosa" has led to further investigations by SELLARDS and LEIVA. Experiments were made with extracts of *Harrisonia perforata*, *Brucea amarissima* and *Castela nicholsoni*, the last of which was found to be most specific. GOLDSMITH and GREENE report that all parts of the plant from root to berry are active. Six to eight ounces of the infusion are given by the mouth daily, one hour before meals, while rectal enemata of 500 to 2,000 cc. of the infusion are injected twice daily, the patient being instructed to retain the fluid as long as possible. FRENCH and SELLARDS consider that the active principle is probably a glucoside. During 1923 they treated seventeen cases with this drug. Extreme variation was noted in the response of

individual cases; in eleven the stools became temporarily free from entamoebae, and in six the effects of the drug were striking.

References.

Extracts of the Simarubaceae.—Sellards (A. W.) & Leiva (L.) xx, 402; Goldsmith (A. A.) & Greene (E. I.) xxi, 343; French (G. R. W.) & Sellards (A. W.) xxii, 8.

Surgical Treatment of Amoebic Dysentery.—Operative interference with the idea of diverting the faecal stream from the ulcerated area or of introducing amoebicidal solutions into the gut have so far received but scant recognition; in fact, they have been regarded with disfavour. Since 1912, Smits has been treating cases which have proved refractory to emetine and E.B.I., by appendicostomy and irrigation through the appendix. Through a catheter the colon is flushed out first with a litre of tepid soda solution and subsequently with a similar amount of dilute silver nitrate over a period of one or two months. Experience having proved these measures inadequate, he now regards caecostomy as a better means of lavage of the ulcerated gut and giving necessary rest to the colon. For six weeks subsequent to the operation the bowel is regularly washed out with amoebicidal solutions. The bowel is then closed. In 16 cases treated in this manner the results were favourable.

Reference.

Surgical Treatment.—Smits (J. C.) xx, 106.

Other Methods.—Van der Togt aims at increasing the osmotic tension in the bowel contents to a degree harmful to the entamoebae by introducing cane sugar in a concentration of 20–40 per cent. Enemata are given twice daily for eight consecutive days. According to his statement the excretion of blood and mucus soon subsides and the patients recover. The method has the advantage of being painless and cheap. Smyrniotis believes that solutions of tannin cause a rapid healing of amoebic ulcerations and destruction of the entamoebae.* One enema should be given daily and the fluid retained for a quarter of an hour.

References.

Other Methods.—Van Der Togt (A. C.) xix, 32; Smyrniotis, xix, 32.

II. Hepatic Amoebiasis and Hepatic Abscess.

A feature of the recent literature on this subject has been the growing conviction that emetine exerts a much more striking and lasting curative action in hepatic than in intestinal amoebiasis. Several recent writers believe that, in the great majority of cases, operative measures are unnecessary since, provided the collection of pus in the liver be not too extensive, emetine alone will bring about its absorption. Manini reports a successful result after a total of 18 gr. of emetine. Hodson believes that the amoebae in the liver are killed by the emetine and that the absorption of the now inert abscess pus is brought about in much the same manner as a gumma of the liver. Lenoble and Jegat have verified the presence of pus in the liver by aspiration and have watched its absorption by emetine therapy. Escomel, who has treated 25 cases in this manner, is of the opinion that, should no immediate improvement follow 3 gr. of emetine, the diagnosis is

* The formula recommended is: Tannin 5 gm., Tinct. opii 20 drops, arrowroot 15 gm., water 1 litre.

not correct. He thinks that whenever possible the injections should be given intravenously. FRY has described two cases in which large abscesses were certainly present, and in both of them all signs and symptoms disappeared after 12 gr. of emetine. He is of the opinion that absorption of sterile pus is in no way detrimental to the patient.

The reviewer has recently confirmed the view that emetine therapy alone can promote absorption of pus from a liver abscess without surgical interference. In a recent case under his care, after no less than three operations had been performed for evacuation of liver pus, the patient developed a fourth abscess, the very pronounced physical signs and symptoms of which were resolved in a short time by emetine combined with E.B.I.

RALLI and PANAYOTATOU are of the opinion that, if emetine is promptly administered, the formation of liver abscess can be prevented, and they quote corroborative statistics showing that before the introduction of emetine the number of operations for liver abscess in Alexandria every year was 20–40; it is now only between 3 and 5. HARTMANN-KEPPEL is of the same opinion. RÉNON and BLAMOUTIER, and BRESSOT believe in combining emetine therapy with salvarsan injections; of the latter one injection of 0·3 gm. is given weekly; they believe that this drug improves the general condition of the patient and favours cicatrization.

The aspiration of large amounts of pus from the liver by means of Potain's aspirator, a method originally suggested by ROGERS, has gained a number of adherents for its obvious advantages over the open operation, of simplicity and avoidance of risk and shock to the patient, though ROGERS has stated that in certain circumstances the open operation may still be necessary. LUDLOW has abandoned open operation as a routine measure. He gives a preliminary treatment by subcutaneous injection of 0·06 gm. emetine daily for 2–4 days. Should, however, aspiration fail to remove all the pus, operation is resorted to, and emetine injections are continued afterwards until symptoms no longer persist. MANSON-BAHR, LOW, PRATT and GREGG report upon a series of fifteen consecutive cases without a death, all treated with aspiration, emetine and E.B.I. Injection of emetine into the abscess cavity after removal of the pus is no longer regarded as necessary. Should the pus prove too viscid for aspiration, the injection of eusol into the abscess cavity renders it sufficiently fluid to pass through the aspirating needle. The advantages of this method are stated as follows:—(1) Aspiration is a simple matter and can be undertaken where pressure on organs, such as the heart, is occurring and the patient is obviously too ill to admit of the major operation; (2) the patient is not necessarily subjected to the ordeal and dread of a general anaesthetic; (3) the stay in hospital is much shortened, the average being less than one month.

THURSTON reports on a series of 64 cases and affirms that the aspiration treatment of liver abscess has been the operation of choice in Bengal during the last 10 years. Out of the total of 64, 49 were treated by aspiration alone, of which 40 were cured and 9 died. Of the 49, 28 were aspirated once with 4 deaths; 12 were aspirated twice with 3 deaths; 7 three times with one death. The largest amount of pus removed at any one aspiration was 96 ozs.; the smallest 4 ozs. With multiple aspirations the largest amount was 220 ozs. Adequate treatment with emetine is as important as the operation. With the emptying of the abscess cavity a negative

pressure is set up and an effusion of serum takes place into it; the object should be to charge this serum with emetine so as to kill off the amoebae in the outer wall of the abscess cavity. Cases in which the abscess cavity has become secondarily infected should be drained at once by means of open operation. TOWNSEND states that aspiration should be reserved for small abscesses, and that cases showing large amounts of pus should be operated upon and drained. In order to ensure free drainage for the pus resection of a rib should be carried out.

REFERENCES.

Treatment of Hepatic Amoebiasis (Hepatic Abscess).

Emetine alone.—MANINI (L.) xix, 31; HODSON (V. S.) xix, 330; LENOBLE (E.) & JEGAT (Y.) xix 682; FALZI (O.) xix, 682; ESCOMEL (E.) xx, 110; HARTMANN-KEPPEL (G. L.) xxi, 21; RALLI (A.) & PANAYOTATOU, xxi, 27; FRY (A. S.) xxii, 5.

Emetine and Salvarsan.—RÉNON (L.) & BLAMOUTIER (P.) xix, 31; BRESSOT (E) xx, 108.

Aspiration and Operation.—JOHN (J. C.) xix, 33; ROGERS (L.) xix, 328; MANSON-BAHR (P.), LOW (G. C.), PRATT (J. J.) & GREGG (A. L.) xx, 705; LUDLOW (A. L.) xx, 706; THURSTON (E. O.) *Lancet*, 1924, Nov. 15, pp. 1008–1010; TOWNSEND (R. S.) *Jour. Roy. Army Med. Corps*, 1924, xliii, 401–421.

MEDICAL ZOOLOGY.

HAUGHWOUT (Frank G.). **Has Parasitology a Place in the Medical Curriculum?**—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress. Singapore,* 1923. pp. 411–419. [1 ref.]

The main argument of this thoughtful paper is that a definite course of instruction in parasitology should be included in the ordinary medical curriculum. Not a course for a zoologist or a parasitologist; but such a course as would give the ordinary medical man some practical knowledge of the methods of the laboratory and an understanding of the full physical significance of parasitism to the host; such a course as would show up parasitology as an integral part of the medical knowledge of the completely-trained clinician able to make intelligible calls on the parasitologist and to interpret the parasitologist's reports.

The author proposes a course of 50 to 60 hours in each of the three recognized branches of medical zoology. Instruction should include the morphology (and potential variation) of the species commonly met with and the habitat and life-cycle of each, with a particular reference to their bearing on pathology and symptomatology, the guiding principles in distinguishing parasitic from non-parasitic forms, and the discrimination between parasitism and commensalism: the fact that certain diseases of non-parasitic origin may be mistaken for pathological conditions caused by protozoon and helminth parasites should be impressed. Such a course, which in some respects must be discursive, can be made effective only by a teacher of broad experience.

A more advanced course, called by the author a "semi-graduate course," for the physician who intends to practise in the tropics, where he will probably have to make his own laboratory diagnoses, should be more zoological in character, but the clinical applications should never be lost sight of.

Courses still more advanced, "graduate courses," for men who intend to undertake original research in parasitology, should be restricted to such as have a bent for zoology, but even here full fruition can be enjoyed only by such as have had a medical training and maintain commerce with pathologists and clinicians. [See also NUTTALL, this *Bulletin*, Vol. 21, p. 792, and LEIPER, p. 929.]

A. Alcock.

HEGNER (Robert W.). **Parasitism among the Protozoa.**—*Scientific Monthly.* 1924. Aug. Vol. 19. pp. 140–155. With 6 figs.

This paper, being itself a critical summary, perspicacious and precise, cannot be condensed. The author, intent on significant speech, distinguishes among those intimate associations of species which are popularly spoken of as "parasitism," (1) *symbiosis*, where two species are intimately associated for mutual benefit, as the termites and their intestinal Protozoa; (2) *commensalism*, where of two intimately associated species the one is advantaged and the other does not obviously suffer detriment by association; and (3) true

parasitism, where the one species is benefited and the other is in varying degrees deranged or damaged by the association. He allows these three distinctions, without pedantically insisting on them, but recognizing that in the case of commensalism, and even in the case of symbiosis, the balance may not always be evenly poised and has sometimes, and in particular circumstances, a suspicious tendency to incline in favour of *one* of the two associates.

Under the heading of Parasitism among the Protozoa he reviews (1) its frequency—estimating that there are as many species living on or in other organisms as there are free-living species (a high estimate when one considers all the free marine forms); (2) the variety of specific range or restriction of the parasite within the host; (3) the variety of range of adaptation to host—the parasite sometimes adapted to one specific host and sometimes to several species of a genus or even of a larger group; and (4) the effects, in the way of simplification or complication, of a parasitic existence on the structure and life-cycle of the parasite. He also considers the origin and evolution of parasitism among Protozoa, stating a number of rational propositions for discussion. And he touches, but without particular reference to Protozoa, on the bearing of parasitism upon the genetic relations and geographical distribution of hosts. It is a profitable paper for advanced students, being distinguished for breadth of view in more senses than one.

A. A.

Maplestone (P. A.). **A Survey of the Parasites found in Natives of Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 183–187. [2 refs.]

The scope of this survey was confined to the faeces of 500, the night blood of 288 and the day blood of 195 adult male prisoners in Freetown gaol. Two smears and a small emulsion in saturated salt solution were made from a specimen of one stool of each man, and these disclosed the following parasites in their respective *percentages*: *Entamoeba histolytica* 15·0, *E. coli* 43·6, *Endolimax nana* 9·8, *Iodamoeba buetschlii* 13·0, *Giardia intestinalis* 2·2, *Chilomastix mesnili* 1·8, *Trichomonas hominis* 2·2, *Enteromonas intestinalis* 2·4, (and Coprozoic flagellates 14·6); *Ascaris lumbricoides* 36·6, *Trichuris trichiura* 18·6, *Strongyloides stercoralis* 15·2, *Enterobius vermicularis* 1·6, Hookworm 76·6, Tapeworm 3·2. Thick films of night blood yielded *Microfilaria bancrofti* in 16·3 per cent. and *Mf. perstans* in 2·4 per cent. *Mf. loa* was not found in the day blood.

A. A.

da Silva (F. Venancio). **Note sommaire sur l'infestation parasitaire de l'intestin des indigènes d'Angola.**—*Revista Méd. de Angola.* (No. especial 1º Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessões.) 1923. Aug. No. 4. pp. 381–388.

This paper contains some local statistics of intestinal parasite infestation at stations in Angola. The protozoon infestations, which are extraordinarily high, are stated generally as "amoebiasis" and "flagellosis," except in one instance where they are given in a detail that perhaps may carry some connotations. In this instance the

examination of stools of 27 patients gave the following results in percentages: amœbiasis, 55·5; flagellosis, 44·4; Chilomydophrys, 11·1; ciliates 3·7; coccidiosis 3·7.

A. A.

Escomel (E.). **Essai sur la parasitologie d'Aréquipa (Pérou) et de ses environs.** *Bull. Soc. Path. Exot.* 1924. Dec. 10. Vol. 17. No. 10. pp. 906-925. With 2 figs.

Arequipa, in the south western extreme of Peru, lies at an elevation of about 7,500 feet, in a valley which, though locally fertile and exuberant in vegetation, has arid and barren surroundings. It is said to be the healthiest town of S. America. Its parasitology is here systematically summarized:

Spirochætes and spirochætoses. Isolated cases of relapsing fever, sometimes associated with epidemics of typhus of imported origin, have occurred, and among apt parasites besides lice there are *Ornithodorus megnini* and *Argas persicus*. Both neurotropic and dermotropic forms of syphilis have been observed. Yaws is not endemic, though sufferers from the Brazil frontier come for cure. *Treponema branchialis* and *T. buccale* are noted.

Protozoa. Amœbic dysentery is not so frequent as it used to be, but amœbic hepatitis is still common owing to the local predilection for capsicum, both forms are soon cured by emetine, without surgical intervention, though injections of silver salts greatly help in banishing amœbæ from the intestine. Malaria, though non existent in Arequipa, is bad in the valleys below; all the three common parasites occur. Trypanosomiasis is not endemic, but cases of "uta" or "espundia" (dermal leshmaniasis) come up from the forest tracts of Peru, and an infection probably of *Trypanosoma cruzi* from the Brazil frontier has been noticed. The universal flagellates *Chilomastix mesnili*, *Giardia intestinalis*, and *Trichomonas vaginalis*, *intestinalis* and *buccalis* are all noted, the author believes that a local batrachian (*Telmatobius gelskii*) is the natural source of all the local human infection of Trichomonas. *Balantidium coli* and its pathogenic effects have been noticed.

Helminths. The liver fluke is common among sheep only. Both the common tapeworms (*T. solium* and *saginata*) are common, as also are *Ascaris lumbricoides*, *Oxyuris vermicularis*, and *Strongyloides stercoralis*. Hookworms do not exist in Arequipa, nor does Trichocephalus. (Belascaris has been found in cats, and Toxascaris in a dog).

Arthropoda. Demodex, the ordinary itch mite and an itch mite from the lama, *Ornithodorus megnini* and *Argas persicus* all attack man in Arequipa, as do all the three species of lice and *Cimex lectularius*. Fleas are not obtrusive in this dry climate. (The only case of plague seen by the author was remarkably benign; it was, however, traced to a dead body of a local rat). The only mosquito in the vicinity of Arequipa is *Culex escomeli*. One species of Simulium (*S. escomeli*) and one gadfly (*Tabanus fulvipes*) are troublesome.

Parasitic fungi. These would seem to be not common. The author mentions *Dermonyces mentagrophytes* (1 case), *Actinomyces bovis* (3), *Trichophyton tonsurans* (in some children) and *T. mentagrophytes* (1), *Trichosporum giganteum* (1), *Monilia albicans* (frequent) and *M. cerevisiæ*, *Malassezia furfur* (2), *Pityrosporum ovale*, *Rhinocladium beermanni* (3), and *Penicillium* sp. (causing a maculation of the skin known as "Ceara" or "Mancha").

A. A.

Witherspoon (J. A.) & Witherspoon (Jack). **A Survey of the Intestinal Parasites found in the Territory supplied by St. Thomas Hospital, Nashville, Tennessee.** —*Southern Med. Jl.* 1924. Sept. Vol. 17. No. 9. pp. 669–672.

A uniform routine examination of stools of all suitable patients, on admission, was carried out for a term of four months—January April. Evidence of parasites was found in 19 per cent. of 375 suitable stools, "pathogenic amoebae" occurring in 12·8 per cent. The list of parasites is as follows: "Amoeba," Chilomastix, Trichomonas, Giardia, Strongyloides, Dwarf tapeworm, Whipworm, Hookworm, Roundworm.

A. A.

Faust (Ernest Carroll). **Observations on North China Intestinal Parasites of Man based on an Intensive Examination of Patients in a Medical Ward of the Peking Union Medical College Hospital.** —*Amer. Jl. Trop. Med.* 1924. July. Vol. 4. No. 4. pp 411–437. [6 refs.]

This is a close and critical study, by a rigorous technique, of 60 cases of patients of the poorer classes, suffering mainly but not necessarily from intestinal disease, in a ward of the Peking Union Medical College Hospital, undertaken to determine the intestinal parasites implicated in the diseases of northern China, and it involved the scrutiny of 1,409 stools. The results are presented largely in the form of statistical tables, the first of which gives the record, for each individual case, of the number of stools examined, the number of days under observation, the preliminary clinical diagnosis, the final primary diagnosis, the secondary diagnosis after examination of stools, the treatment and its results, and the specific intestinal parasites detected. In two cases the primary diagnosis was entirely changed on the results of the microscopic examination.

Of the 60 patients 48 were "positive" for intestinal parasites: 27 had protozoon infestations (12 protozoon only), and 36 helminth infestations (21 helminth only), (and 15 both together therefore). Of protozoa *Entamoeba histolytica* was present in 12, *Caudamoeba sinensis* in 4, *E. coli* in 12, *Iodamoeba buetschlii* in 2, *Trichomonas hominis* in 10, *Giardia lamblia* in 2, *Embadomonas sinensis* in 8, *Chilomastix mesnili* in 5, Bodo (?) in 6, *Cercomonas longicauda* in 1; the number of cases of amoebic dysentery was 13 and of *E. histolytica* carriers 1. Of helminths *Ascaris lumbricoides* was present in 24, Ancylostoma or Necator in 13, *Trichuris trichiura* in 8, *Oxyuris vermicularis* in 1, *Hymenolepis nana* in 4, *Taenia saginata* in 1, and *Dicrocoelium dendriticum* in 1.

As regards flagellate infestation "the entire clinical history in each case preponderates in favour of . . . . . an indication of an abnormal intestinal balance."

Improper disposal of nightsoil is the source of the common parasitic diseases in North China, and prevention appears to the author to be a simpler matter there than in other parts of the Orient. It must be mentioned that the results of the present survey are compared throughout with the results of the survey of human intestinal parasites in Central China carried out by the author and Wassell (see *Bulletin* Vol. 19, p. 458).

A. A.

Le Noir (P.) & Deschiens (R.). **Étude statistique concernant les infestations parasitaires du tube digestif à Paris.**—*Arch. des. Malad. de l'Appareil Digestif et de la Nutrition.* 1924. Apr. Vol. 14. No. 4. pp. 293–298.

This paper gives the statistics of serial studies in Paris of stools of 1,000 adult males suffering from gastric or entero-colitic trouble of some sort.

The animal parasites [among which Blastocystis is included] discovered are classified as follows, in percentages of cases: (1) Species definitely pathogenic; *Entamoeba dysenteriae* 5·0, *Giardia intestinalis* 7·5, *Taenia solium* 0·5, *T. saginata* 1·5, *Dibothriocephalus latus* 0·5, *Ascaris lumbricoides* 1·0, *Oxyuris vermicularis* 1·0, *Ancylostoma duodenale* 0·1. (2) Species ordinarily little pathogenic: *Trichocephalus trichiurus* 20·0 (in association with *E. coli* in 50 per cent. of the instances). (3) Species doubtfully pathogenic: *Chilomastix mesnili* 0·2, *Trichomonas intestinalis* 0·3. (4) Non-pathogenic species: *Entamoeba coli* 30·5 (in association with other species in 80 per cent. of the instances), *Endolimax nana* 0·5, *Blastocystis hominis* 15·0 (in association with *E. coli* in 66 per cent. of the instances).

Thus definitely pathogenic species were present in 17·1 per cent. of the stools. The infestations with Ascaris and Oxyuris are regarded as abnormally low. The infestations with Giardia and *Entamoeba dysenteriae* (=*histolytica*) were in patients having a "colonial" history in 4 and 70 per cent. of the instances, respectively. The infestation with hookworm was autochthonous. The character of the stools associated with the different parasites is described, and the fluctuating nature of the pathological reactions to the parasites, particularly to the Protozoa, is commented on.

A. A.

Smith (A. Malins). **The Spread and Incidence of Protozoal Infections in the Population of this Country.**—*Brit. Med. Jl.* 1924. Nov. 15. pp. 897–898. [7 refs.]

Some of the original observations of Malins Smith and his collaborators (see this *Bulletin*, Vol. 9, p. 445, and Vol. 11, p. 47), observations that have enlightened the eyes of the medical profession to the world-wide significance of *Entamoeba histolytica*, and in their re-echoed confirmation have played a part in clarifying our ideas of "tropical disease," are here re-stated in the hope that they may have their full effect upon home-staying sanitarians.

A. A.

Bach (F. W.). **Weitere Untersuchungen ueber die Verbreitung parasitischer Darmprotozoenarten des Menschen innerhalb Deutschlands.** [The Distribution of Intestinal Protozoa of Man in Germany.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1924. Oct. Vol. 28. No. 10. pp. 428–443. [20 refs.]

Of 435 individuals (214 adult, 221 under 15 years) examined in the Rhine province 37 per cent. were infested with intestinal protozoa. The species observed were, in percentage, *Entamoeba coli*, 23·2; *E. histolytica*, 3·9; *E. hartmanni*, 2·1; *Endolimax nana*, 7·8; *Iodamoeba buetschlii*, 4·8; *Giardia intestinalis*, 14·9; *Chilomastix mesnili*, 1.4.

A. A.

KITAEW (F.) & IOFF (I.). **Zur Parasitologie und Klinik multipler Protozoeninfektion.**—*Rev. Microbiol et Epidémiol.* Saratov. 1924. Vol. 3. No. 1–2. In Russian pp. 69–74. [13 refs.]. German summary pp. 105–107.

Short account of a patient in the clinic at Saratov (S.E. Russia) who, with all three species of malaria parasites in his blood, was also for one concurrent month suffering from a dysentery relapse and passing active *Entamoeba histolytica* in his stools (as well as *E. coli*, Trichomonas, Giardia and Blastocystis), and yet during the 2½ months that he was under observation kept a temperature that may be regarded as normal, since it only occasionally rose (in the evening) to 98·9° or 99·5° Fahr.

A. A.

FAUST (Ernest Carroll). **Anomalies found in Fecal Examinations in China.**—*China Med. Jl.* 1924. Oct. Vol. 38. No. 10. pp. 820–824.

This paper emphasizes the everlasting truth that a man cannot examine stools microscopically for diagnostic purposes until he has become familiarized with the distractions and delusions inherent in simple faecal matter magnified. Apart from air-bubbles and droplets of oil and an infinite variety of undigested and partially digested animal and vegetable tissue-elements, and apart also from living protozoa and other kinds of animalcules introduced in diluents, there may occur objects that puzzle even the practised eye, particularly in the faeces of people of unconventional tastes and habits. Among things of this last category the author from his extensive experience mentions myxosporidia, probably from infected fish ; segmenting and embryon eggs of the edible snail Viviparus, from a man who had been eating the snails ; nematode worms (Mermis) from uncooked cabbage, and Gordiid worms from grasshoppers and crickets (delicacies among certain races); eggs of flies. He also reminds the reader of the coprozoic protozoa, and of red blood cells which may indicate merely a congestion of the haemorrhoidal vessels.

A. A.

JACOBS (Walter A.). **Certain Aspects of the Chemotherapy of Protozoan and Bacterial Infections.**—*Medicine.* Baltimore. 1924. May. Vol. 3. No. 2. pp. 165–193. [38 refs.]

This instructive paper covers much the same ground as DALE's lecture (see below, pp. 326–328).

The early attempts to kill bacteria in the living host with chemical agents that are strongly germicidal *in vitro* led to the conclusion that therapeutic disinfection is impossible ; the toxic affinity was found to be greater for the animal tissues than for the bacteria. Even with later synthetic drugs, few kept their bactericidal powers in the presence of serum. Optochin, however, is at last one good instance of a synthetic compound that can exercise bactericidal powers *in vivo*.

Even in the case of optochin its inhibitive action on the pneumococcus was at first supposed to be direct ; but the observation that a small dose of optochin in oil, which was itself quite ineffective against an experimental pneumococcus-septicaemia in the mouse, was capable, when employed in concurrence with a quantity of homologous anti-pneumococcus serum also far below the effective dose, of increasing

the threshold value of the serum at least fifty times, suggests something more than a direct bactericidal action; it points to some biological co-operation in the therapeutic process.

The chemotherapy of protozoon infections is next considered—the nature and some of the activities of trypan red, trypan blue, Bayer 205, and of the arsenical derivatives atoxyl, salvarsan, and tryparsamide, showing how they all "by indirections find directions out." In the case of tryparsamide "there seems every reason to attribute its efficacy [in trypanosomiasis] not only to its powerful stimulating action on the animal economy and on the animal resistance, but to its great tissue penetrability and to its affinity for the tissues of the central nervous system which are involved in the more advanced stages of the human disease. This property has been demonstrated again in the behaviour of the drug in certain types of neurosyphilis."

A. A.

Cleland (J. Burton). **Injuries and Diseases in Australia attributable to Animals (except Insects).** *Med. Jl. Australia.* 1924. Oct. 4. 11th Year. Vol. 2. No. 14. pp. 339-345. [33 refs.]

This is a very comprehensive collection of Australian observations and records of accidents and injuries, mostly of an unusual though not elsewhere unmatched kind, caused by animals outside the notoriously venomous orders of snakes and insects. It is curiously and generally interesting, and has much value as a zoologically classified record. The author notes that Backhouse seems to have been the first, in 1836, to describe tick-bite paralysis.

A. A.

Byrne (Kevin). **Injuries and Diseases in Australia attributable to Animals.** [Correspondence.] *Med. Jl. Australia.* 1924. Nov. 15. Year 11. Vol. 2. No. 20. p. 539.

The writer draws attention to red ants, the stone-fish (*Synanceia horrida*), crocodiles, turtles, and sea-snakes as additions to Dr. Cleland's list of noxious animals of Australia. (See above.)

A. A.

Paradice (W. E. J.). **Injuries and Lesions caused by the Bites of Animals and Insects.** *Med. Jl. Australia.* 1924. Dec. 20. 11th Year. Vol. 2. No. 25. pp. 650-652. With 2 text figs.

An interesting confirmation, from the author's own experience, of a chapter of accidents familiar to those who, in the tropics, have participated in the sequestered but fascinating calling of marine surveyor. The author mentions the bites of aggressive eels; poisoning from the flesh of the parrot-fish (Tetrodon) and—in certain circumstances—from a perciform fish known in Australia as "Chinaman"; wounds from the envenomed spines of sting-ray, dog-fish, and the cat-fish Plotosus; urtication and inflammation from setae of Eunicid worms and spines of sea-urchins, from cuts and scratches by living coral, and from the slime of jelly-fish.

A. A.

Grübel (Erich). **Spezifische Hautreaktion bei Impfungen mit Extrakten von menschlichen Parasiten (Oxyuren, Läuse usw.).** [Specific Skin Reaction to Injections of Extracts of Human Parasites (Oxyuris, Lice, etc.).] *Dermat. Woch.* 1924. Oct. 4. Vol. 79. No. 40. p. 1182.

If a saline emulsion—or a filtered extract, even if heated to boiling-point—of a threadworm or a crablouse be injected into an individual infested with either of those parasites, respectively, there follows in five minutes, at the site of the injection, a progressive itching and an obvious rash (Quaddelbildung). No such reaction occurs in the uninfested individual. Further critically definitive experiments are to be undertaken; at present the author merely emphasizes the specific reaction to an existing infestation, states that it is most outright in the case of threadworm, and that in the case of crablouse it is not elicited a few days after the parasites have been got rid of. Thirty-five experiments were made altogether.

A. A.

Kofoid (Charles A.), Swezy (Olive) & Kessel (John F.). **On the Distinctions between *Endamoeba coli* and *Councilmania lafleuri*.** *Univ. California Public. Zool.* 1924. Jan. 31. Vol. 26. No. 3. pp. 21–39. With 24 figs. [6 refs.]

The following is the authors' summary of this their reply to Wenyon's criticism (*Bulletin*, Vol. 19, p. 19) of the nature and relations of *Councilmania lafleuri*.

"The conclusion of Wenyon's review is that 'the amoeba *C. lafleuri* is none other than *Entamoeba coli*.' The following facts controvert this conclusion: (1) The case reported in our first paper had been clinically cured of an infection by *E. dysenteriae* and thereafter had motile amoebae with clear pseudopodia and cysts of *Councilmania*, but none of *E. dysenteriae* in 113 examinations. (2) Cases in which only *C. lafleuri* was detected exhibit motile stages with clear pseudopodia only, while some of the attendant cysts appear with chromophile ridges, pores, buds, variable numbers of nuclei whose central karyosomes are dispersed, and with eight chromosomes at mitosis. These characteristics are persistent in cases of infection continuously examined. (3) Cases in which only *E. coli* was detected present motile stages with granular pseudopodia only, and the attendant cysts do not have chromophile ridges, pores, or buds. The karyosomes are excentric, small and solid, and the chromosomes are six in number. These characteristics are persistent when tested. (4) Mixed infections present both types. (5) These characteristics remain as stated on transfer to rats in cases of single and mixed infections." [See below, p. 333.]

A. A.

Strong (Richard P.). **Investigations upon Flagellate Infections.** *Amer. Jl. Trop. Med.* 1924. July. Vol. 4. No. 4. pp. 345–385. With 6 plates. [36 refs.]

The author's own summary and conclusions are as follows:—

"In studying certain infectious diseases of plants and in searching for animal parasites in the latex of various tropical plants in Central and South America, a flagellate parasite was discovered in three species of *Euphorbiae*. This flagellate is of the leptomonas type and is not dis-

similar in appearance to the flagellate stage of *Leishmania tropica* giving rise to a form of tropical ulceration of the skin. In one district in Panama a very extensive phytodemic of the infection in *Euphorbiae* was found to exist. These plants were very abundant in this region and almost every one was found infected. The infected plants showed pathological changes, and the latex of the plant was also distinctly altered—the flagellates causing disturbances in the circulation of the plant, sometimes forming emboli in the lactiferous channels. The nutrition of the plant was thereby distinctly disturbed and many of the plants became atrophied.

"The insect *Chariesterus cuspidatus* transmitting the infection from the plant to a species of lizard *Cnemidophorus lemniscatus* was also discovered. From extensive experiments upon animals it was demonstrated that the flagellate as it occurs in the plant, and also in the intestinal tract of the insect, is not pathogenic for vertebrates. However, after the flagellate has passed through the insect to the lizard, it acquires pathogenic properties and may give rise to a form of tropical ulceration in the skin, as was demonstrated from experiments in the monkey. In this ulceration the leishmania form of the parasite and not the flagellate stage is encountered.

"There is perhaps nothing very extraordinary in the idea that a flagellate found producing a disease in plants may after passing through an invertebrate and a vertebrate host, acquire pathogenic properties for a mammal. This apparently is the first instance of this nature in which such a chain of infections has been demonstrated."

The records of the experiments appear in full in reprints of the article.

A. A.

YAMASAKI (Shigeru). **Ueber** *Leptomonas ctenocephali, Trypanosoma lewisi* **und pathogene Trypanosomenarten im Hundefloh.** [*Leptomonas ctenocephali, Trypanosoma lewisi* and Pathogenic Trypanosomes in the Dog-Flea.]—*Arch. f. Protistenk.* 1924. June 6. Vol. 48. No. 1. pp. 136–179. With 1 plate & 5 text figs. [45 refs.]

From careful comparison of natural and cultural forms of *Leptomonas ctenocephali* with cultural forms of *Leishmania donovani* the author is convinced of their individual specific distinctness; moreover, mice and puppies cannot be infected experimentally with the Leptomonas of the flea.

With regard to *Trypanosoma lewisi*, the author finds that the rat is as infective to the rat-flea in the chronic stage, when few or no trypanosomes can be detected in the blood, as it is in the acute stage; also that the flea can impart the infection by its bite, as well as by the usual faecal route; and also that an intracellular proliferation in the epithelium of the flea's gut is not a necessary preliminary of the development of the trypanosome in that insect.

In the author's experiments *Schizotrypanum cruzi* (33 expts.), *Trypanosoma brucei* (14), *T. equinum* (21), *T. equiperdum* (25), and *T. evansi* (14) were not transmissible to fleas, though the specific trypanosomes retained life in the fleas' gut for 45 minutes, 90 minutes, 3 hours, 5 hours, and 4 hours, respectively. This tenacity of life under inhospitable conditions is regarded by the author as an argument in favour of mechanical transmission of trypanosome infection among vertebrate hosts.

A. A.

LLOYD (Ll.). **Note on the Occurrence of a Herpetomonad in *Glossina morsitans*.**—*Bull. Entom. Res.* 1924. Nov. Vol. 15. Part 2. pp. 185–186. With 1 fig. [1 ref.]

Description and figures of a herpetomonad discovered in three individuals of *Glossina morsitans* in N. Nigeria, in one instance concurrent with *Trypanosoma vivax*. The herpetomonad, which is distinguished by an unusually large kinetonucleus, was found in the proboscis and midgut, but not in the salivary glands; among the many individuals observed two possessed an undulating membrane, and some of those in the gut had no flagellum or only a rudiment of one.

A. A.

ROSS (W. C.), assisted by HUSSAIN (Mahomed). **On the Life History of *Herpetomonas muscae domesticae*. A Preliminary Note.**—*Indian Med. Gaz.* 1924. Dec. Vol. 59. No. 12. pp. 614–615.

In a startling "preliminary" flash a life-history of the herpetomonas of the housefly is here very briefly disclosed. The parasite is said to enter the fly in the form of a minute spore, which passes through the intestinal wall into the underlying tissues, where, in the course usually of 3 days, it "divides by fission, multiplies, and grows to maturity." The mature flagellates then pass back into the lumen of the intestine, where they precipitately enter into a process of sexual conjugation, which is followed by division of the macronucleus culminating in the issue of a number of minute spores. These, which constitute the infective stage, are found in great numbers in the fly's gut. The flagellates do not long survive this reproductive process. The authors have never observed fission of the flagellates, though the act of conjugation, and sometimes also the rapid motion of the flagellum, may give rise to the appearance of fission. The authors have observed all the stages mentioned in the above account of *H. muscae domesticae* in cultures of the kala azar parasite also.

A. A.

BOECK (William C.). **Studies on *Tricercomonas intestinalis* (Wenyon and O'Connor, 1917).**—*Amer. Jl. Trop. Med.* 1924. Nov. Vol. 4. No. 6. pp. 519–535. With 12 figs. [16 refs.]

Tricercomonas intestinalis, originally discovered (and described) by WENYON and O'CONNOR in men of the Egyptian Expeditionary Forces, is here described in minute detail, well figured in its active and encysted phases, and confirmed in its generic status.

A. A.

CHAGAS (Carlos). **Fécondation de la *Prowazekia cruzi*.**—*C.R. Soc. Biol.* 1924. Oct. 31. Vol. 91. No. 30. pp. 988–990. With 11 figs.

The author has been studying for some time the sexual reproduction of a free flagellate, *Prowazekia cruzi*, and here describes and figures several stages, the serial connexion and relations of which are to be explained, along with necessary complemental detail, in a forthcoming publication.

A. A.

HEGNER (Robert W.). **Giardia and Chilomastix from Monkeys, Giardia from the Wild Cat and Balantidium from the Sheep.**—*Jl. Parasit.* 1924. Dec. Vol. 11. No. 2. pp. 75–78. With 4 text figs. [3 refs.]

The author lists 12 described species of Giardia—from mammalian, avian, reptilian, and amphibian hosts—each being specific to the corresponding host so far as critical study has yet gone; he also assumes

the existence of other species, one (from the wild cat) the encysted form of which is here figured and briefly described, its specific status having still to be determined, and another (from the S. American monkey *Ateles geoffroyi*) here similarly described and figured as a new species. Chilomastix cysts from the S. American monkey, *Cebus apella*, and a Balantidium from a sheep are also described and figured.

A. A.

GALLI-VALERIO (B.). **La lambliase.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessoes.) 1923. Aug. No. 4. pp. 447–459.

There is nothing novel in this paper. The author agrees that lambliasis is a morbid entity, chronic, and characterized by alternating diarrhoea and constipation, considers that rats and mice very probably contribute to its spread, thinks that at the moment the best treatment is salvarsan or some analogous compound, and recommends the ordinary sanitary prophylaxis.

A. A.

DE MELLO (Froilano) & DA SILVA (Francisco Venancio). **Première contribution à l'étude des flagellés de l'intestin des indigènes d'Angola.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessoes.) 1923. Aug. No. 4. pp. 475–485. With 3 plates. [7 refs.]

The flagellates here discussed and plentifully figured are *Chilomastix mesnili, Cercomonas longicauda*, and a species of Bodo— all from stools of natives of Angola.

A. A.

DESCHIENS (R.). **Variations tinctoriales et métabolisme de l'amidon chez Giardia.**—*Bull. Soc. Path. Exot.* 1924. Dec. 10. Vol. 17. No. 10. pp. 889–894. [5 refs.]

Several authors have described Giardia cysts staining blue with iodine solution, and the author has observed an instance of the same reaction in active forms of Giardia. In the present paper he gives particulars (1) of a find of blue-staining active forms in a cat whose jejunum contained starch in great abundance, and (2) of a find of active forms colouring yellow and cysts colouring rose-violet or lilac-violet with iodine solution in a case of chronic diarrhoea. Furthermore, cysts from this last find after keeping for three days stained the most part yellow with iodine solution. The author concludes therefore that Giardia certainly can convert dextrin into glycogen, and probably starch into dextrin.

A. A.

LEWIS (Paul A.). **The Inhibitory Effect of Acridine on the Sporogony of a Coccidium** (*Eimeria stiedae*).—*Jl. Experim. Med.* 1924. Aug. 1. Vol. 40. No. 2. pp. 263–267. [3 refs.]

Experimenting *in vitro* with various chemicals and drugs known to be noxious to Protozoa the author finds that the only one having a fairly constant inhibitory effect on the ripening of the oocyst of the Coccidium of the rabbit is acridine hydrochloride. In concentrations of 1 in 10,000 down to 1 in 80,000 development of nearly all unripe oocysts is entirely inhibited, and in concentrations of 1 in 100,000 to 1 in 1,000,000 it is obstructed. Occasionally, however, an individual cyst is found to develop normally, regardless of the concentration of acridine to which it is exposed. Moreover, if the oocysts have proceeded to the formation of sporoblasts, acridine has no effect upon their further development.

A. A.

Adie (Helen). **The Sporogony of** *Haemoproteus columbae*.—*Bull. Soc. Path. Exot.* 1924. July 9. Vol. 17. No. 7. pp. 605–612. With 5 text figs. & 2 plates. [4 refs.]

In face of some unintelligible expressions of doubt of her conclusions regarding the sporogony of *Haemoproteus columbae* in the Hippoboscid fly, *Lynchia maura*, published in the *Indian Journal of Medical Research* in 1915 (see this *Bulletin*, Vol. 6, p. 189), Mrs. Adie has re-investigated this subject in Dr. Edmond Sergent's laboratory in the Pasteur Institute of Algiers, and here gives in full detail, with illustrations of the several stages of development, the complete confirmation of her original researches. She describes and figures the development of the ookinete and encysted vermicule in *Lynchia maura*, the various stages of the growing oocyst, the bursting sporocyst, and the free sporozoites, which last invade the fly's salivary glands from 10 to 12 days after an infective feed. Infected salivary glands of *Lynchia maura* injected subcutaneously into an imported and certified clean pigeon produced an infection of Haemoproteus parasites in the bird's peripheral blood 27 days later. Mrs. Adie's research was carried out under the direction and strict criticism of Dr. Sergent, and no doubt can now remain about the fact that the praeter-vertebrate development of Haemoproteus is essentially similar to that of Plasmodium and Proteosoma.

A. A.

Shortt (H. E.) & Swaminath (C. S.). **Note on** *Nosema adiei* **(Christophers, 1922).**—*Indian Jl. Med. Res.* 1924. July. Vol. 12. No. 1. pp. 181–183. With 1 plate. [3 refs.]

Description and coloured figures of *Nosema adiei*, the parasite once mistaken for an extra-corporeal form of the kala azar parasite. So far the authors have found it only in *Cimex hemiptera* (=*rotundatus*)—often enough to breed doubt and confusion, but not often enough to breed the indifference that follows familiarity. It has been recognized so far in the insect's gut, salivary glands, and ovaries, in three forms—spores, planonts, and meronts. Spores predominate (free and intracellular) and, when numerous, can be recognized in the fresh dissection, by refringency; they have average dimensions of 3μ by 1·7μ and stain (Romanowsky) pale blue with a central deeper blue, or red, dot; often they occur in clumps often along with one or more meronts. Planonts (not definitely intracellular) are the least numerous and are not distinguishable fresh; they are amoebules about 1·6μ in longest diameter and they stain blue or cobalt except for a relatively large excentric mass of chromatin. Meronts (free and intracellular) greatly vary in size, the average dimensions being 3·2μ by 2·7μ; they stain cobalt blue and have one or two large central or excentric masses of chromatin—never rod-like.

A. A.

Ohi (Tsukasa). **On the Morphology, Development, and Reproduction of** *Balantidium coli* **Malmsten, and its Cyst.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. of Formosa.*) 1924. July. No. 235. [In Japanese. With 2 plates. 21 refs.] English summary pp. 1–3.

This author has observed conjugation and multiplication by budding in *Balantidium coli*; the latter process is described as beginning with the macronucleus. He has also made observations of the remarkable resistance of Balantidium cysts: kept in faeces under

cover at a temperature of 50° to 70° F. they remain alive for 1 to 1½ month; kept in moisture, for 2 months; left dry, in the shade, for 1 or 2 weeks; exposed to direct sunshine they die in 3 hours. The cysts resist a saturated [aqueous?] solution of $HgCl_2$ for an hour and a 5 per cent. solution of carbolic acid for 3 hours, gastric juice at 98·3° F. for 6 hours, bile for 15 days, and urine for 10 days. Some cysts will survive for 12 hours or more in a saturated solution of common salt.

A. A.

MacGregor (Malcolm E.). **Special Apparatus and Technique for the Study of Mosquitoes and other Aquatic Insects.**—*Parasitology.* 1924. Dec. Vol. 16. No. 4. pp. 388–397. With 7 text figs.

Some ingenious and useful devices are here described and explained in clear detail: as the making of nipples for pipettes, out of ordinary rubber-tubing; of catheter pipettes, for collecting tree-hole larvae; of creosote bottles for entomological storage boxes; and of "floating harbours" for keeping mosquito-eggs from getting stranded by evaporation. Some useful methods of fine technique are also happily described: as the management of experimentally-fed mosquitoes, and of individual larvae and pupae; methods of treating the infected stomach and of staining the wing; of killing mosquitoes in a good pose, and of mounting them; and of preserving larvae and pupae.

A. A.

MacGregor (Malcolm E.). **Tests with *Chara foetida* and *C. hispida* on the Development of Mosquito Larvae.**—*Parasitology.* 1924. Dec. Vol. 16. No. 4. pp. 382–387. [11 refs.]

The author gives a full account of some very careful experiments in growing *Chara foetida* and *hispida* in—or adding extract of Chara to—natural water in which mosquito larvae were kept, and he states that so far as any ill effects on Anopheles (*A. bifurcatus*) larvae are concerned his observations agree with those on other Anopheline larvae in an environment of *Chara robbinsii* recorded by Barber (see *Bulletin* Vol. 21, p. 776). Some larvae of *Culex pipiens* certainly suffered from being kept merely in water in which Chara was growing, but the author reasonably attributes this to their being in an environment unnatural for the species. As a final conclusion he thinks it "certain that Chara can have no generally useful application in practical anti-mosquito measures."

The author emphasizes the proviso that in all experimental work on this subject fidelity to natural conditions should be observed—that the water in which the influence of living Chara (or Chara extract) is being studied should not only contain food for the mosquito larvae, but should also be of the proper pH temper; also incidentally that Chara extract should be free from contamination.

He records that *Anopheles bifurcatus* and *maculipennis*, *Culex pipiens*, and *Ochlerotatus nemorosus*, placed in large cages each of which contained a bowl of water and Chara and a bowl of water and stalks of grass, all dropped their eggs indifferently in either bowl.

A. A.

HAWORTH (W. E.). **Mosquitoes and Coconut Palms. A Mosquito Survey of Palm Trees in East Africa and the Problems resulting therefrom. With an Appendix describing Two New Species of Mosquitoes from Coconut Palms in East Africa.** By EDWARDS (F. W.).—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. Oct. 23. Vol. 18. No. 4. pp. 162–198. With 3 charts & 4 plates.

A very complete account of a laborious and very careful survey already mentioned in this *Bulletin* (Vol. 20, p. 792). The survey, which was continued for more than 2 years and 8 months, was concentrated around ten different stations—chiefly township areas—distributed along the coastal tracts of Kenya Colony and Tanganyika territory and the adjacent islands. Altogether 10,382 palms were examined, and collections of living mosquito larvae and pupae were discovered in 7,747 of them—in water collected in the axils of the leaves—at all seasons of the year, even in times of comparative drought. The number of species of mosquitoes identified was 28. Among these species *Anopheles costalis* occurred in 57 collections, *A. pretoriensis* in 1, *Aëdes argenteus* (=*Stegomyia fasciata*) in 3,802, and *Culex fatigans* in 2,354. The larvivorous larvae of *Megarhinus brevipalpis* occurred in 62 collections, and of *Lutzia tigripes* in 134. The estimated heights of palms yielding larvae and pupae ranged from 10 to 70 feet. The sources of the water were not conclusively settled; rain certainly was not the only source; after careful observation and consideration the author thinks that it may sometimes have come from dew, and possibly from leakage of crude sap from injuries inflicted by insects. The water supports a varied fauna besides mosquito larvae: the forms identified include larvae of Psychodidae (Pericoma and Psychoda); Chironomidae (Dasyhelea, Culicoides, and Chironomus); Drosophila; Apiochaeta (Phoridae); and Eristalis (Syrphidae); also 3 species of beetle larvae, including Dytiscidae and Hydrophilidae; not to mention some possibly accidental and temporary inhabitants.

A. A.

RIPLEY (L. B.). **Sodium Fluoride as an Insecticide: its Possibilities as a Locust Poison.**—*Bull. Entom. Res.* 1924. Aug. Vol. 15. Pt. 1. pp. 29–34.

Sodium fluoride is effective against cockroaches and earwigs, and, as the present author here shows, against locusts; in these instances it acts through the stomach. But apparently it can also act through the breathing-orifices of some insects, as a "contact" poison, since it has been used with success for killing bird-lice (Mallophaga). [It may therefore have useful applications, to be determined by experiment, in medical entomology.] It has the two great advantages of cheapness and comparative safety, for although 15 grains are reported to have killed a 20 lb. dog, the animal held out for four days. At any rate, it is not classed as a poison and is an important ingredient (being an ovary irritant) of certain poultry-spices in general use. Sodium fluoride is in the main a by-product of the aluminium industry. Its chief source is cryolite, one of the principal aluminium ores, from which it is dissolved out by treatment with caustic soda. It is sold in the form of a white powder.

A. A.

Anderson (T. J.). **Bloodsucking Insects and their Allies in the Colony and Protectorate of Kenya.**—*Kenya Med. Jl.* (Supplement). 1924. Aug. Vol. 1. No. 5. 14 pp.

The species of blood-sucking flies of all sorts, fleas, bed-bugs, blood-sucking lice, biting lice (Mallophaga) and ticks at present known to occur in the Colony and Protectorate of Kenya are here listed—along with the localities where they have, severally, been reported—in systematic zoological array. The catalogue fills nearly 12 pages.

A. A.

Cooling (L. E.). **The Larval Stages and Biology of the Commoner Species of Australian Mosquitoes, with the Biology of** *Aëdes pecuniosus* **Edwards.**—*Commonwealth of Australia Dept. of Health Service Publication* (*Tropical Division No.* 8. 1924. 40 pp. With 1 plate & 15 figs. [12 refs.]

In this useful paper are adequately described, along with good figures of their characteristic parts and with ample details of their breeding-places, habits, and biology, the larvae of 11 species of Australian Culicidae, and among them *Aëdes aegypti* (=*Stegomyia fasciata*) and the closely similar *Aë. notoscriptus*. The following instance of the tenacity of *Stegomyia fasciata* is worth quoting :—

"A new earthenware pitcher was recently bought from a pottery. The pitcher, which had never contained water before, was filled with rain-water, which had been boiled and allowed to cool; the spout was netted, but not the lid, which contained a small thumb-nick.* Seven or eight days afterwards fully-grown larvae of *Aëdes aegypti* were noticed. The water was emptied out entirely and filled up several times with a strong jet of water; the water was emptied out vigorously after each of the fillings. The pitcher was then filled with clean water and netted with fine cloth gauze on the spout and top, the net being secured by elastic bands; a couple of days afterwards young larvae in the second instar were noticed. The pitcher was again emptied and swilled out more thoroughly than before. Filled up with clean water for a second time and again effectively screened against mosquitoes, the same species of larvae was noticed again after the third day. A third treatment produced the same results; but it is interesting to note that after each treatment the number of larvae noticed was progressively less. From the time of the first treatment and mosquito-proofing to the present—*i.e.*, the last washing of the pitcher—about four weeks have elapsed."

A. A.

Rudolfs (Willem). **Mosquito Breeding in Specific Places.**—*Jl. Parasit.* 1924. Dec. Vol. 11. No. 2. pp. 79–83. [1 ref.]

The main conclusions from the careful experiments here summarized are that acidity of water, as such, does not affect mosquito breeding; that the food supply for larvae, which might be dependent on the chemical composition of the water, is the main determining factor: and that high amounts of toxic aluminum and iron sulphates in waters from clay-pits are inhibitive.

A. A.

* This nick is at the perimeter; after it passes one of the two diametrically opposed thumb-like protuberances immediately over the counterbore, the lid is slightly rotated so that tilting of the vessel will not dislodge the lid.

França (Carlos). **L'emploi des plantes dans le combat des moustiques.** —*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 3. 3a, 4a, e 5a. Sessoes.) 1923. Aug. No. 4. pp. 419–422.

The author advocates the employment of suitable aquatic plants in anti-mosquito measures and mentions the names of some of the species that have been recommended for this purpose. He mentions with particular approval Azolla, which effectually prevents mosquitoes from breeding where it forms an unbroken mat over the water, and *Utricularia vulgaris*, which he himself has observed trapping a large number of larvae of *Anopheles bifurcatus* and *Theobaldia spathipalpis*.

A. A.

Carter (H. R.). **Preferential and Compulsory Breeding Places of *Aedes* (*Stegomyia*) *aegypti* and their Limits.**—*Ann Trop. Med. & Parasit.* 1924. Dec. 30. Vol. 18. No. 4. pp. 493–503. Also *Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 228–238. [Published by United Fruit Company, Boston, Mass.]

"We must speak by the card or equivocation will undo us." The author having expressed his wide American experience of the matter in the following formula: "We have not found this mosquito (*Aëdes* (*Stegomyia*) *aegypti*) breeding, in nature, completely, that is, from oviposition to imago, in any collection of water, all the sides of which at the water's edge were of mud," now has to restrict his predicate by the qualifying addition of the words "in the Americas." For two observers in the Gold Coast of West Africa discovered *Aëdes* (*Stegomyia*) *aegypti* breeding in company with *Culex fatigans*, and with complete and formidable success, in water collected in footprints in the mud of a lagoon. This discovery has led him to re-examine his original proposition most carefully and to confirm it as qualified and restricted. It has also induced him to publish here some useful and salutary reflections on compulsory breeding-places and their limits.

A. A.

Brug (S. L.). **De voornaamste Ned. Indische culicinen.**—*Vereen. tot Bevordering der Geneesk. Wetenschappen in Nederl.-Indië.* 1924. Nov. 53 pp. With 18 text-figs.

A good account—limited to the single tribe—of the Culicini of the Dutch East Indies. Following a table for discrimination of species, each species is succinctly described, in male and female, and its breeding-places and geographical distribution indicated.

A. A.

Edwards (F. W.). **Mosquito Notes.—V.**—*Bull. Entom. Res.* 1925. Jan. Vol. 15. Pt. 3. pp. 257–270.

The following items are worthy of note here:—

Anopheles punctulatus, *Aëdes* (*Stegomyia*) *variegatus* (=*pseudo-scutellaris*) and *argenteus* (=*Stegomyia fasciata*) and *Culex fatigans* occur in the Solomon Islands, and *Aëdes* (*Stegomyia*) *albolineatus* (=*Stegomyia scutellaris*) in the neighbouring island of New Ireland.

A. A.

SWELLENGREBEL (N. H.). **Over de dichtheid der anopheles-bevolking om Amsterdam in de afgeloopen vier jaren.** [On the Density of the Anopheline Population around Amsterdam during the Last Four Years.]—*Nederl. Tijdschr. v. Geneesk.* 1924. Aug. 30. Vol. 68. 2nd Half. No. 9. pp. 1113–1125. With 4 charts in text. [5 refs.]

The author has tried to find out whether the destroying of hibernating Anophelines around Amsterdam, combined with other measures (especially destruction of larvae), has resulted in a reduction of the numbers of Anophelines in houses and stables, and whether there is a correlation between the changes in these numbers and the changes in the malaria-rate in some villages in the districts under observation where this rate was accurately known. The numbers of Anophelines present was measured by those caught in houses or stables (recorded separately), expressed as an average number caught per house and per stable in each month. (The largest numbers are found in the autumn, sometimes also in January and February. Then the number diminishes in March–May, to rise again till autumn.)

It was not everywhere possible to demonstrate in this way a lasting reduction in the number of Anophelines. There was some reduction in 1922, but this did not continue in 1923. At the same time malaria, which in some villages had been most prevalent in 1920, in others in 1922, dropped to very low figures in 1923. In some portion of the district, however, a marked and lasting reduction had been obtained under the necessary restriction; this is ascribed to the measures taken.

It was observed that the fertility of the females (the percentage carrying mature ova) had been greatly reduced in 1923, in consequence of which the reduction of the number of anophelines, said to have occurred by some observers (but not apparent in the figures at the author's disposal), might be due as much to this natural phenomenon as to the measures taken. In the region where a more permanent reduction had been obtained with certainty this result had been obtained before this marked fall in the fertility and could not be explained by it.

The author concludes that, notwithstanding this partial result, the campaign still partakes too much of the nature of an experiment to recommend its adoption in other countries similarly situated.

N. H. Swellengrebel.

SWELLENGREBEL (N. H.). **Nog een opmerking over de dichtheid der Anophelinen bevolking om Amsterdam.** [Further Remarks on the Density of the Anopheline Population around Amsterdam.]—*Nederl. Tijdschr. v. Geneesk.* 1924. Dec. 20. Vol. 68. 2nd Half. No. 25. pp. 3120–3124. With 3 charts in text.

The writer's paper showing no apparent permanent reduction in the Anopheline population around Amsterdam after some years of continuous destruction of adults in stables and houses has been criticized. Also his remark that there is no apparent correlation between the temporary Anopheline reduction in 1922 and the decline of the malaria-rate. It is asserted that the rise in the number of Anophelines found in houses in 1923 was an artificial one, since from April of that year the catches were made only in houses where Anophelines were known to occur in sufficiently obvious numbers.

In this paper the writer shows that the malaria rate went down in 1921 in Nieuwendam and in 1923 in Sloten, and that the Anophelines showed a temporary reduction in 1922. Furthermore, that even when particular houses that have been examined are taken at more or less regular intervals into consideration no proof can be gained of a reduction of the Anopheline population. He therefore cannot alter his opinion, but he grants that a reduction may have occurred, though its existence cannot be demonstrated. It has not been his intention to discourage in any way the present attempts to destroy Anophelines, which ultimately may prove to have been highly useful, if only as an experiment on a large scale.

N. H. Swellengrebel.

SWELLENGREBEL (N. H.). **Over de pogingen tot vernietiging der larven van** *A. maculipennis.* [On Endeavours to destroy Larvae of *A. maculipennis.*]—*Nederl. Tijdschr. v. Geneesk.* 1924. Sept. 27. Vol. 68. 2nd Half. No. 13. pp. 1576–1591. With 1 chart. [15 refs.]

Around Amsterdam the breeding-places of *A. maculipennis* are found in the numerous ditches of the "polders" surrounding the town. They cannot be filled in because they are necessary for the drainage of the land (1–4 metres below the level of the sea); nor be treated in the ordinary way, because cattle drink the water and the peasants are afraid that the milk will acquire a disagreeable flavour. They have been dealt with by oiling with neutral and inodorous liquid paraffin, in quantities of 3 cc. per square metre of water-surface. The larvae are killed not by any chemical action, but by the tracheae being filled with paraffin, even into their minute ramifications, by aspiration through the spiracles. If once this aspiration has taken place, the larvae die, even if they do not remain under the paraffin covering. Consequently, this cover need not be continuous. To estimate the influence of the oiling on the Anopheline population, the percentage of the males ("male census") has been determined in the two years preceding action (1920 and 1921) and during it (1922 and 1923), on the assumption that if the oiling reduces the number of newly hatched mosquitoes this must become apparent by the reduced number of the short-lived males, even before the longer living females begin to diminish in numbers. It has been found that oiling coincided with a marked change in the curve of the half-monthly male-census. In 1920 and 1921 this curve showed three peaks in June, July and August; in 1922 (first year of oiling) the middle peak had disappeared and the male-census had been reduced in comparison to 1921. In 1922 the oiling had been performed only where larvae were found. In 1923, to prevent the first hatching, apparent by the first male-peak, oiling had been done everywhere. This, however, had a contrary effect, owing probably to the more extensive surface to be oiled diminishing the thoroughness by which the work was done. [In 1924 the first method has again been adopted, and now it has been possible to take away both the middle and terminal top of the curve.—Sw.]

In laboratory experiments it was found impossible to prevent larval development by the action of *Chara foetida.*

N. H. Swellengrebel.

KLIGLER (I. J.). **Flight of Anopheles Mosquitoes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. Oct. 23. Vol. 18. No. 4. pp. 199–202.

In the author's experience the most accurate method of determining the distance of flight of Anopheles is by observations of given species at known distances from accurately surveyed breeding-places. Though apparently less, it is really more accurate than the method of tracing the flight of insects that are released after suffering all the manipulation involved in staining. By the first method the author, in Palestine, has satisfied himself that *Anopheles elutus* [=*maculipennis*], a common house-haunting species, can travel in considerable numbers from 4·5 to 5 kilometres, and that *A. superpictus* and *sergenti* and *multicolor*—also house-haunters—usually travel 2 km.

A. A.

NIKOLSKY (V. V.). **Observations on the Ability of Larvae of *Anopheles maculipennis*, Mg., to Crawl.**—*Bull. Entom. Res.* 1924. Nov. Vol. 15. Part 2. pp. 177–178. [2 refs.]

Larvae of *Anopheles maculipennis* have been observed by the author, in the Moscow district, to be able to crawl in all stages of their growth. The utility of this power must tell "in the preservation of the species; but is somewhat limited, since only relatively small distances can be covered, and that only on very damp soil." One larva was observed to travel, with occasional stoppages, 75 cm. under natural conditions; and another, in the laboratory, 106 cm.

The author has also observed adult *Anopheles maculipennis* emerging from pupae simply lying amongst débris on moist soil.

[Dr. F. W. O'CONNOR, in Samoa, frequently observed larvae of *Finlaya kochi* creeping like caterpillars on the leaf-stalks of the taro.]

A. A.

LEGENDRE (J.). **L'anophélisme à Lataquié.**—*Bull. Soc. Path. Exot.* 1924. Oct. 8. Vol. 17. No. 8. pp. 653–657. [3 refs.]

In the sea-coast town of Latakia, in Syria, the only species of Anopheles discovered by the author in 7 months was *bifurcatus*—the larvae being found in the domiciliary cisterns and the adults occasionally in the house. Having discovered the existence of a species that transmits the parasites, the author searched for indications of malarial fever, but found only one autochthonous case, a European. Among the native school children examined (270) only 4 were found to have an enlarged spleen, and only one of these had lived all his life in Latakia.

A. A.

i. IYENGAR (M. O. T.). **On the Indian Anophelines of the *Funestus* Group and the Description of a New Species (Diptera, Culicidae).**—*Indian Jl. Med. Res.* 1924. July. Vol. 12. No. 1. pp. 23–29. With 1 plate & 2 text figs. [4 refs.]

ii. STRICKLAND (C.). **The Anophelines *funestus*, *minimus*, and *aconitus*, including a Description of the Larva of *minimus*.**—*Ibid.* pp. 145–152. With 2 plates. [11 refs.]

i. With regard to Anopheles of the *funestus* "group" Iyengar tabulates and figures the minute differences between *listoni* [=*funestus*],

minimus, and a "new species," *varuna*, common in Bengal and other parts of India, having "characters intermediate between *listoni* and *minimus*." He leaves *aconitus* as a variety of *minimus*.

ii. Strickland, however, gives good reasons—potent among which is the fact that the two forms are identical in the larva and pupa stages—for regarding *minimus* as merely another name for *funestus* (=*listoni*); but he insists on the specific distinctness of *aconitus* on the ground that its larva has distinctive characters of its own. Strickland's general proposition that where two adult-forms of mosquitoes are indistinguishable throughout their larval stages they should be ranked as varieties of a single species is very sound.

A. A.

CHRISTOPHERS (S. R.). **Some Himalayan and Peninsular Varieties of Indian Species of Anopheles.**—*Indian Jl. Med. Res.* 1924. July. Vol. 12. No. 1. pp. 11–13.

This paper deals considerably with the geographical distribution of *Anopheles gigas* and *A. lindesayi*, both of which are found in the Himalayas and the mountains of southern India—the former also in Ceylon, Java and Formosa—but not anywhere else, a distribution which is here—as it has been before, and elsewhere—described as "peculiar." [It seems therefore advisable to draw attention to the fact that this remarkable geographical distribution—so wide, yet so distantly localized—so far from being peculiar to these two mosquitoes, is strikingly exemplified in other groups of animals, both vertebrate and invertebrate, and has frequently been discussed by zoologists. A. R. WALLACE in the chapter on the Oriental Region, in his classical *Geographical Distribution of Animals*, describes, as one of the main features of its Ceylon and South Indian Sub-region, the existence here of numerous animals allied to forms only found again in the Himalayas or in the Malayan Sub-region (where Java is included). W. T. BLANFORD also, in his memoir on the *Distribution of Vertebrate Animals in India, Ceylon and Burma* (*Phil. Trans. Roy. Soc.*, 1901, series B, Vol. 194), pays particular attention to "the remarkable fact" that his Malabar Tract (in which the highlands of Ceylon are also included as an "outlier") contains many Himalayan or Burmese vertebrates (or *both* Himalayan and Burmese) that are not found in other parts of the Indian peninsula. And, finally, in the *Catalogue of Indian Potamonidae*, published by the Trustees of the Indian Museum in 1910, this "remarkable fact" noticed by BLANFORD is corroborated in the distribution of the freshwater crabs. If one *has* to surmise how it is that so many animal forms represented in the highlands of Indo-China, Indo-Malaya, and Indo-Ceylon are absent from the greater part of the Indian peninsula, one might suggest a land-connection of the three regions in those Miocene times when South India and Ceylon appear to have been widely separated by sea from the Asian continent west of long. 90°E.; and Carpenter's Ridge, standing up 6,000–7,000 feet from the greatest depths of the floor of the Bay of Bengal, between the Nicobars and Ceylon, might be supposed to represent one of the sunken finger-posts of that connection.]

A. A.

Christophers (S. R.). **Some Further Varieties of Indian Species of Anopheles, with Notes on the Species *A. pallidus* Theobald and *A. philippinensis* Ludlow.**— *Indian Jl. Med. Res.* 1924. Oct. Vol. 12. No. 2. pp. 295–301. [5 refs.]

Here are described *Anopheles culicifacies* var. *adenensis*, from the Aden territory; *A. jeyporensis* var. *moghulensis*, from numerous localities in north-western and central India; and *A. maculatus* var. *dravidicus*, from numerous localities in north-eastern, central, and southern India—all three being "new" varieties. *A. varuna* of Iyengar is here placed as a variety of *A. minimus*. Differential diagnoses are given of *A. fuliginosus* Giles, *A. pallidus* (originally described as a variety of *fuliginosus*) and *A. philipp[in]ensis* Ludlow (formerly known as *A. fuliginosus* var. *nivipes*).

A. A.

Stekhoven (J. H. Schuurmans) & Stekhoven-Meijer (A. W. Schuurmans). **Aanteekeningen omtrent anophelinenbroedplaatsen op de Bandoengsche Hoogvlakte.** [Notes on Anopheline Breeding Places on the Bandoeng Plateau.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1924. Vol. 64. No. 4. pp. 588–591.

This plateau has an altitude of 2,000–5,000 feet above sea level. The most common species was *A. barbirostris*, breeding in fish ponds, wet rice fields, puddles and pools on the sides of the roads. *A. vagus* and *rossi* breed in muddy pools, hoofprints of buffaloes, etc.; the larva of *A. fuliginosus* was common in rice fields up to an altitude of 5,000 feet, that of *A. kochi* in rice fields and fish ponds up to 3,000 feet. Other species were rather uncommon. In none of the breeding places were larvae found in great numbers as in the fish ponds near Batavia.

W. J. Bais.

Leon (N.). **Action des ectoparasites sur les culicides.**— *Ann. Parasit. Humaine et Comparée.* 1924. July. Vol. 2. No. 3. pp. 211–213. With 2 figs.

An Anopheles profusely infested with larval acarines is figured. A mycotic tumour of the abdomen of an Anopheles, consequent on a wound made by a Culicoides, is described, and a gastric hernia in an Anopheles, due to the same cause, is figured and described.

A. A.

Ciurea (T.) & Dinulescu (G.). **Ravages causés par la mouche de Goloubatz en Roumanie; ses attaques contre les animaux et contre l'homme.**— *Ann. Trop. Med. & Parasit.* 1924. Oct. 31. Vol. 18. No. 3. pp. 323–342. With 1 fig., 1 map & 3 plates. [15 refs.]

The annual summer visitations of that peculiarly venomous Simulium midge (*S. columbaczense*) upon the farms and pastures of Transylvania and the Danube plains are well known. The peasants are prepared for them, and usually therefore the damage inflicted by these midges is limited to a few dozen cattle. In 1923, however, the invasion was particularly extensive and severe, and 16,474 animals—horses, asses, oxen, buffaloes, sheep, goats, pigs—were officially reported to have been killed in the course of a few days, with enormous suffering to the maddened creatures. It was noted that the mortality occurred in the first 4 or 5 days of the invasion—which points to the speedy acquisition of immunity by survivors.

The individual bite leaves a weal like a flea-bite, but confluent bites form haemorrhagic patches, swollen, hard, inflamed and extremely painful. Animals severely bitten become breathless and may die in a few hours; or they cease feeding and remain apathetic, their pulse and respiration become almost imperceptible and their temperature subnormal and they may die in 6 or 7 days, or they may gradually recover. At post mortem examination "nothing has been observed but congestions and degenerations of the chief viscera, especially the heart, liver, and kidneys," In man the bites cause a burning pain, and the petechiae may coalesce in erysipelas-like patches which may become oedematous and vesiculous or even pustulous, with concurrent inflammation of the lymph vessels and glands. In man also generalized symptoms occur—formication, cold extremities, algidity, feeble pulse, subnormal temperature, diarrhoea, transient retention of urine, but fatal results have not been recorded.

A. A.

TONNOIR (A. L.). **Australasian Simuliidae.**—*Bull. Entom. Res.* 1925. Jan. Vol. 15. Pt. 3. pp. 213–255. With 13 figs.

This admirable monograph, which does not pretend to be final and exhaustive, contains, besides tables for the discrimination (so far as material is available) of the species of Australasian Simuliidae in their adult male and female, larval, and pupal stages, and besides significant descriptions of the several species, an excellent and interesting account of the bionomy of these flies and of their general structure as adults and as larvae and pupae. The species, 21 in number, are separated in two genera, namely *Simulium* (5 spp.) having antennae of eleven segments and *Austrosimulium* (16 spp.) with antennae of ten segments. Several of the species of the latter genus, however, cannot be discriminated in the adult stage, though their earlier stages—particularly the pupae—are easily distinguishable; 15 of the species are here recorded for the first time. The author disavows ENDERLEIN's classification of the Simuliidae, as unnatural.

A. A.

GLASER (R. W.). **A Bacterial Disease of Adult House Flies.**—*Amer. Jl. Hyg.* 1924. Sept. Vol. 4. No. 5. pp. 411–415. With 1 plate. [2 refs.]

Here is carefully described in itself and in its culture reactions, *Staphylococcus muscae*, an infection of houseflies which, under experimental observation, does not spread among these insects in epidemic fashion, but sporadically, and is very tardily fatal to 50 per cent., killing them in 7 to 29 days. The author states explicitly that the economic application of this staphylococcus is unpromising.

A. A.

GLASER (R. W.). **Rearing Flies for Experimental Purposes, with Biological Notes.**—*Jl. Econom. Entom.* 1924. Aug. Vol. 17. No. 4. pp. 486–496. With 5 figs. [5 refs.]

The flies here considered are *Musca domestica*, *Stomoxys calcitrans*, and *Lyperosia irritans*. The author describes his methods of breeding and handling them for experimental purposes in detail that cannot be summarized. Principles and practices emphasized are that the insects should never be treated roughly, *e.g.*, that in starting breeding operations flies should be caught singly in a tube; that longevity and

reproduction are greatly influenced by the nature of the food and by conditions of temperature and moisture ; and that scrupulous cleanliness must be observed.

Certain observations of general biological interest are appended. The author has reared *Musca domestica* from mid-April to mid-December, after which the progeny died in the larva or pupa stage. For a long life and healthy reproduction this species must have sugar (or assimilable starch) and some form of soluble proteid ; milk is thus very suitable. On this diet it might live up to 57 days. Favourable temperatures for the larva are 30°–35°C. The developmental cycle from egg to adult at 20°–35°C. was 13–19 days. The sex ratios of all broods were generally equal. Fresh horse-dung was the best pabulum for the larvae.

Stomoxys calcitrans was reared from April 22nd to December 7th, after which the progeny died out. This species will live and will breed on a diet of defibrinated blood administered in the usual way on the covers of breeding-jars. The developmental cycle from egg to adult ranged from 14 days in a hot July to 43 or more days in spring and autumn. The sex ratios of broods showed a slight preponderance of males.

Lyperosia irritans sticks always to cattle, except that now and then females temporarily drop from a beast to deposit their eggs in the fresh dung. Wild gravid females placed in breeding-jars containing fresh cow-dung will drop eggs for 3 to 5 days and may be kept alive for as many as 25 days on defibrinated blood, but they do not exercise their reproductive function on that diet. The developmental cycle from egg to adult in this species was 11 days in a hot July and 20–22 days in May-October. The sex ratios observed were equal.

A. A.

Lloyd (Lleweliyn), Johnson (W. B.), Young (W. A.) & Morrison (H.). **Second Report of the Tsetse-Fly Investigation in the Northern Provinces of Nigeria.**—*Bull. Entom. Res.* 1924. Aug. Vol. 15. Pt. 1. pp. 1–27. With 1 coloured map, 5 charts & 2 figs. [8 refs.]

The second instalment of this valuable report (for first instalment see this *Bulletin*, Vol. 20, p. 794) records the details and results of a systematic investigation of the breeding-seasons, food, and trypanosome infections of *Glossina morsitans* and *tachinoides* carried on during 14 months in a set area of the Sherifuri district of N. Nigeria.

Additional evidence of a breeding episode was supplied (1) by an obvious prevalence of flies having a pliant ptilinum, and (2) by an equally plain preponderance of unhatched pupae over empty pupa-cases. Thus, in the case of *G. tachinoides*, sudden and striking increase, at the *beginning of the dry season*, in the proportion of comparatively soft flies with a ptilinum easily forced out by pressure, concurrent with evidence of a very high percentage of living pupae, was taken to indicate that as the onset of the breeding season. By similar reasoning the onset of breeding of *G. morsitans* was settled to be about six weeks later.

The nature of the food-host during the critical wet season was determined not by the exact blood precipitin test employed by Bull and King in their Anopheles experiments (see this *Bulletin*, Vol. 21, p. 143), but by microscopic examination of red blood corpuscles. This method is good enough for separating mammalian blood and for discriminating

between avian and reptilian corpuscles; but for mammalian blood it has merely permitted the authors to distinguish between some miscellaneous collections individually, inclusive of species of such distant affinity as dog and man, water-buck and fruit-bat, bush-buck and squirrel, wart-hog and donkey. Two significant and valuable facts, however, have been elicited from all this hard labour on mammalian bloods, namely, that during the critical wet months immediately preceding the breeding-season consummatory for the perpetuation of the species *G. tachinoides* is sustained very largely by the blood of reptiles (probably crocodile and Varanus), and *G. morsitans* to some extent by that of birds. Evidence is also accumulated that *tachinoides* is a much more miscellaneous blood-sucker than *morsitans*.

The nature of the trypanosome infections was determined by systematic examination of the proboscis, anterior part of salivary glands and gut of a large number of flies, and the results are thus summarized by the authors: —

"The infection of the flies with *T. vivax* and *T. congolense* bears a close relation to the amount of blood obtained from antelope, and consequently *morsitans* is in general nearly four times as heavily infected as *tachinoides*. Infections with *T. brucei* and *T. gambiense* are scarce in this locality. Trypanosome infection rises just before the main breeding season in *morsitans* in all localities and in *tachinoides* in places where the fly is largely a mammal feeder. The proportional infection in general falls in the season of most rapid breeding, owing to masking of the actual rise by the number of young flies examined" [flies with pliant ptilinum, etc.]. "It rises rapidly when breeding ceases. The total infection is reduced, when fly food is hard to obtain, in the time of long grass and flood, owing to *T. vivax* infections dying out when the flies are starved. In some cases *T. grayi* may be obtained by *tachinoides* when it feeds on Varanus, and a somewhat similar infection in the laboratory may be obtained by feeding the flies on toads."

The authors have a little evidence, which they intend to follow up, that burning of the grass shortly before the rains begin may hamper the free breeding of *morsitans* and in some circumstances that of *tachinoides*. They also mean to observe the effects of excluding game and pig from a fly focus in the dry season.

A. A.

LAMBORN (W. A.). **An Attempt to Control** *Glossina morsitans* **by Means of** *Syntomosphyrum glossinae*, **Waterston.**—*Bull. Entom. Res.* 1925. Jan. Vol. 15. Pt. 3. pp. 303–309. With 1 map in text.

In 1914 AUSTEN suggested the introduction of the Chalcidid Spalangia (known to be a destructive parasite of Muscid flies) into tracts where *Glossina morsitans* is a pest; the author, however, discovered Spalangia to be of common occurrence in E. Africa, where, though it is destructive to small Muscids, it does not, so far as can be ascertained, touch Glossina.

Since then a good deal of work has been done on this subject in various parts of tropical Africa, as a result of which several species of Mutillid and Chalcidid Hymenoptera as well as of Bombyliid flies have been discovered as natural native parasites of Glossina, and particularly of *G. morsitans*.

The author explains that not all these natural parasites give promise of effective exploitation against tsetse-flies generally. For general application such a parasite should be one that can be easily bred in

the local laboratory (*i.e.*, must be patient in captivity and capable of adapting its life-cycle to some convenient laboratory host), and that can be so bred quickly in large numbers (*i.e.*, must be prolific and have a short life-cycle). The author decided upon the Chalcidiid *Syntomosphyrum glossinae* as a parasite that could thus easily be bred in the laboratory in numbers large enough to be launched against *G. morsitans*, in a given area, with prospect of success.

Syntomosphyrum was bred in the puparia of various Muscid flies, particularly Sarcophaga. In one instance a parasitized puparium of Sarcophaga gave issue to 40 males and 94 females of Syntomosphyrum. The males were eager to pair, and the females were ready to attack fresh puparia within a few hours of emergence.

A sufficient number of laboratory-parasitized Sarcophaga puparia being in process of accumulation, they were gradually distributed along paths and game-runs in a peninsula of Lake Nyasa having an area of about 42 square miles. (For protection against other insects the parasitized puparia were placed each in a tube of bamboo having the open end plugged and a hole in one side for the escape of the parasites as they hatched, the tubes being stuck in the ground upright). In the course of five months (June–October) a number of parasitized puparia had been distributed sufficient to give issue by approximate estimate to 277,179 individuals of Syntomosphyrum.

It must be explained that for some months immediately before this distribution of laboratory-parasitized Sarcophaga-puparia the naturally existing incidence of Syntomosphyrum in the selected area of experiment had been as carefully as possible determined. During the five immediately preceding months 1,083, and during a term immediately before that 935, puparia of Glossina had been collected in the area, and 0·6 per cent. of the first lot and 0·4 of the second lot had been found naturally parasitized by Syntomosphyrum.

Two months after the distribution of the laboratory-parasitized Sarcophaga-puparia had been completed an investigation of the selected area was commenced to ascertain whether the incidence of Syntomosphyrum upon Glossina had been affected as a result of the experiment. In the course of 3 months (January-March) 516 puparia of Glossina were collected in the area, and 8·7 per cent. were found to be parasitized by Syntomosphyrum.

"It is true that a rise in the parasitism rate to the degree indicated is a far step from having effected a degree of control of the fly of real practical value. It should, however, be pointed out that the parasites were liberated during the dry hotter months of the year, when insect life generally is at a minimum . . . Experimental work with an even greater output of Syntomosphyrum maintained during the round of seasons might possibly be worth while. With efficient assistance, if only that of intelligent and reliable natives, there appears to be practically no limit to the numbers of the parasites that could be bred in the laboratory, at all events during the middle months of the year."

A. A.

Curson (H. H.). **Outline of the Floral Regions of Zululand.**—Reprinted from the *S. African Jl. Sci.* 1923. Dec. Vol. 20. pp. 323–346. With 6 figs. & 1 map. [8 refs.]

The point of interest for us in this botanical paper is to be found in the statements that "in Zululand . . . Glossina occur only in those

areas where bushveld is the chief type of vegetation," and that in "valley bushveld"—*i.e.*, in the valleys of bushveld tracts that lie between the coastal plains and the highlands—"it is the bush of the stream banks that Glossinae prefer, and unfortunately it is these very situations that the European farmer neglects" to clear and cultivate. Bushveld, as pictured in the plate, looks like a blend of moorland and scrub; it appears from the text to have been described by different authors as park-like landscape, tree steppe, bush savannah, and deciduous savannah forest.

A. A.

VAN SACEGHEM (René). **Note sur la dispersion des Glossines au Kivu.**—*Ann. Soc. Belge de Méd. Trop.* 1924. Nov. Vol. 4. No. 2. p. 177. [1 ref.]

Glossina palpalis (var. *fuscipes*) has been said to exist at an altitude of 1,500 to 3,000 metres (about 5,000 to 10,000 feet) among the volcanoes of Kivu, although the observation has been doubted. The author has searched this region and states that Glossina does *not* exist along the shores of the lake of Kivu.

A. A.

TROLLI (G.). **Contributions à l'étude de la distribution géographique des Glossines.**—*Ann. Soc. Belge de Méd. Trop.* 1924. Nov. Vol. 4. No. 2. pp. 181–190. With 1 map.

The author gives numerous particularities of distribution of *Glossina palpalis, morsitans, pallicera, tabaniformis,* and *fuscipleuris* in the Belgian Congo, along with a map indicating the spots where he has observed the first two species.

A. A.

POTTS (W. H.). **A New Variety of *Glossina schwetzi*, Newstead & Evans, from the Belgian Congo.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 205–206. With 1 text fig.

Independent taxonomic recognition is proposed for a single specimen differing from type in some small details of the male genitalia.

A. A.

DIXON (O. Jason). **An Unusual Case of Rhinal Myiasis, with Recovery.**—*Jl. Amer. Med. Assoc.* 1924. Oct. 25. Vol. 83. No. 17. pp. 1332–1333. With 3 text figs.

One interesting feature here is that the victim was a clean, sober, industrious man. He had a nose-bleed; and the day afterwards, as he was using a scythe, he thought a bug had got into his nose. He felt certain that he had got it out, and dismissed the matter. Some days after this he felt something wrong with his nose—pain there, and headache; and when, seven days later, he was brought for treatment, he was delirious, had a temperature of 101·6°, and "presented the exact picture of facial erysipelas"; a nauseating smell and some occasional drops of foul sanguineous fluid came from his nose, and both nostrils were full of maggots and slough. 221 live maggots were removed on the spot and then both nostrils were plugged with cotton-wool soaked in chloroform. After 5 minutes the plugs were removed; 14 dead maggots were picked away, and soon the patient's condition

was much improved, though he subsequently discharged some dead maggots. Three days after the first treatment the patient expectorated a few more living maggots; so the treatment was repeated, and 10 days afterwards the last dead maggot was got rid of. The patient recovered in due time, but his middle turbinate bones and a considerable part of the cartilaginous septum were destroyed. The maggots, which are well figured, are screw-worms.

A. A.

KEILIN (D.). **On a Case of Intestinal Myiasis in Man produced by the Larvae of a Sarcophagine Fly.**—*Parasitology.* 1924. July. Vol. 16. No. 3. pp. 318–320. With 2 text figs. [3 refs.]

The author identifies as first-stage larvae of a Sarcophagine fly some small maggots of a lot of 40 to 50 passed at Nairobi by an anaemic sepoy after treatment for supposed hookworm. The patient subsequently made a rapid recovery. Incidentally the author mentions other cases proving that larvae of Sarcophagids—he mentions specifically *S. haemorrhoidalis*—can live in the human intestine.

A. A.

DESOIL (P.). **Valeur de l'hypothèse de l'infestation par oeufs de mouches myasiques dans le cas de myase intestinale chez l'homme.**—*C.R. Soc. Biol.* 1924. Nov. 21. Vol. 91. No. 32. pp. 1079–1081.

The observations here recorded confirm those of other authors. They show that the eggs of Muscidea, though capable of withstanding a certain amount of chemical injury in vitro, are quite unsuited for the rough treatment of the alimentary canal, where they are soon killed or whence they are soon ejected. Intestinal myiasis therefore can hardly be due to ingestion of fly eggs.

A. A.

PUMPELLY (William C.). **Case of Human Infestation by Larvae of the Fly** *Eristalis Tenex* [*sic*].—*Jl. Amer. Med. Assoc.* 1925. Jan. 3. Vol. 84. No. 1. p. 37.

Case of a man who had long suffered from constipation and in whom "nothing unusual was found except tenderness . . . along the course of the descending colon." In his faeces "worms" of two kinds were observed, one kind being rat-tail larvae of the "drone-fly" *Eristalis tenax.*

A. A.

CHOWN (Gordon). **Report of a Case of Cutaneous Myiasis in an Infant.** *Wohlfahrtia vigil* (**Walker**) **Infection.**—*Canadian Med. Assoc. Jl.* 1924. Oct. Vol. 14. No. 10. pp. 967–968. [3 refs.]

In this case the infestation first showed as small boils scattered about the neck and one on the pinna and one in a popliteal space—in all 12; 14 very active maggots about 4 mm. in length were ultimately removed from them (3 coming from one spot).

A. A.

Bacot (A. W.) & Martin (C. J.). **The Respective Influences of Temperature and Moisture upon the Survival of the Rat Flea (*Xenopsylla cheopis*) away from its Host.**—*Jl. of Hyg.* 1924. Sept. Vol. 23. No. 1. pp. 98–105. With 3 text figs. [10 refs.]

The rapid fall of cases with the onset of hot weather is a characteristic feature of plague epidemics in Northern India, but it is impossible to say how far this may be due to the high temperature and how far to concurrent drying power of the atmosphere. Epidemiological observations made in Mauritius, Southern India, and Java suggest that a rise of temperature without increased drying power restrains plague epidemics. Drying power, of coure, depends on saturation deficiency, and is not indicated by the meteorological term "relative humidity." Previous investigations both in India and in England have shown that saturation deficiency is inimical to the flea at almost every stage of its life-history. The object of the experiments described in this paper was to ascertain the separate influences of temperature and drying upon the longevity of fleas (dissociated from their host where, of course, they enjoy a nearly constant climate). The ingenious methods employed for arranging atmospheres having the same temperature but different saturation deficiencies, and *vice versa*, and of exposing batches of laboratory-bred fleas (*X. cheopis*) of various age and condition to the varying atmospheric environment cannot be abridged.

The conclusions from the experiments are as follows :—

"1. The survival of fleas (*X. cheopis*) apart from their host is approximately in inverse proportion to the saturation deficiency of the air, provided the temperature and air movement are constant. In other words, it is proportional to the rate at which they lose water.

"2. Under similar conditions but with constant saturation deficiency, their length of life is reduced to between one-half and two-thirds by 10° C. rise in temperature. Compared with the effect of saturation deficiency, that of temperature upon the longevity of fleas is, within the range of climatic conditions over the greater part of India, a smaller one.

"3. A variation in saturation deficiency from 5 mm. to 35 mm. such as occurs in the plains of Northern India at different seasons would, accordingly, shorten the average duration of life of wandering rat fleas in the proportion of 15 to 1. As a rise in mean temperature occurs simultaneously with the increase in saturation deficiency and may amount to a difference of 20° C. between January and June this would reduce the length of life of wandering fleas to about one-third. The effect of saturation deficiency and increased temperature will be additive and would go a long way to explain some of the climatological features of the epidemics."

A. A.

Buchanan (George). **La faune des rongeurs et de leurs parasites cutanés qui interviennent dans la propagation de la peste.**—*Bull. Office Internat. d' Hyg. Publique.* 1924. Nov. Vol. 16. No. 11. pp. 1392–1406.

Most of the contents of this paper are familiar. They include a list of Muridae known to inhabit Great Britain, a list of fleas of more or less common occurrence on British rats, and a list of the fleas of known possibility of occurrence on rats in different countries; also a statement of fleas found on rats in particular places in Great Britain. For instance, in the area of a small epidemic of plague in East Suffolk

in 1909–10, 584 fleas were obtained from 568 rats examined; of these fleas one was *Ctenophthalmus bisoctodentatus*, 259 were *Ct. agyrtes*, and 324 *Ceratophyllus fasciatus*; the number of fleas found on the individual rats ranged from 0 to 10, except in one case where 30 were discovered; among fleas found in 6 rat-nests were 2 *Hystrichopsylla talpae*. The published opinions of WILKINSON and of LATHAM on the possible intervention of *Pulex irritans* as a plague carrier are quoted also.

A. A.

BLAZY (M. C.). **Considérations sur les rapports de la faune des rongeurs avec les manifestations pesteuses à Dakar.**—*Bull. Soc. Path. Exot.* 1924. Nov. 12. Vol. 17. No. 9. pp. 834–845. With 1 text fig. [35 refs.]

There is not much substance in this paper, nor any novelty in the conclusion, which is that "the relation between the rodent fauna and the manifestations of plague is one of cause and effect." As regards facts, it is stated that 278,755 rats were destroyed at Dakar in 1922–23, and that none of the very few examined showed any evidence of plague infection; that the predominant flea infesting the rats examined was *Xenopsylla cheopis*, and that none of the few fleas examined gave any such evidence; and that among the human population there has not been any case of plague since the 17th July, 1923.

The local rodents, identified by ROUBAUD, are *Mus rattus*, *M. alexandrinus*, *M. decumanus*, *M. coucha*, *M. golunda campanae*, and hybrids between some of these. The number of fleas obtained from 185 rats examined was 462.

A. A.

LASNET. **Note contenant, en ce qui concerne l'Indochine, des renseignements sur la faune des rongeurs et de leurs parasites cutanés, sa répartition topographique et ses rapports avec les manifestations pesteuses.**—*Bull. Office Internat. d'Hyg. Publique.* 1924. Nov. Vol. 16. No. 11. pp. 1407–1414. [1 ref.]

Epidemic foci of plague are known to exist in South Annam, Cochinchina, Saigon-Cholon, Cambodia, and Phnom-Penh. At the last-named place a musk-rat (*Crocidura murina*) was discovered to be heavily infected and also to be infested with *Xenopsylla cheopis*. *Mus decumanus* and *rattus* are here mentioned, along with other species designated only by their vernacular names, as the common rodents, and *Xenopsylla cheopis* as the greatly predominant rat-flea, though *X. astia* and *Pulex irritans* have also been observed.

A. A.

PAWLOWSKY (E.) & STEIN (A. K.). **Experimentelle Untersuchungen über die Wirkung der Flöhe auf den Menschen.**—*Rev. Microbiol. et Epidemiol.* Saratov. 1924. Vol. 3. No. 3. In Russian pp. 131–136. [3 refs.] German summary p. 216.

From the summary this appears to be a paper of the "precious" sort. The gist of it is that "purpura pulicosa"—or small blood-stain that persists for 2 or 3 days after a flea-bite—can be produced by injection of saline emulsion of flea salivary glands into the skin; and that the saliva of the dog-flea and man-flea is weaker than that of Pediculus.

A. A.

Blacklock (B.) & Thompson (M. G.). **Rat-Fleas in Freetown, Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 135–137. [5 refs.]

From 62 black rats and 38 brown rats collected from various parts of Freetown (Sierra Leone) in January and February, 657 fleas were removed, namely, 419 *Xenopsylla brasiliensis*, 235 *X. cheopis*, and 3 *Ctenocephalus canis*.

A. A.

Jobling (B.). **A Contribution to the Biology of *Ornithodorus moubata*, Murray.**—*Bull. Entom. Res.* 1925. Jan. Vol. 15. Pt. 3, pp. 271–279. With 1 plate & 3 figs. [11 refs.]

As the biology of *Ornithodorus moubata* has already been investigated by Cunliffe (see this *Bulletin*, Vol. 19, p. 492) the present author confines himself to certain novel or particularly significant points in this well-illustrated paper.

In most cases the larva is ready to leave the egg on the 8th day and remains motionless until the first moult, which occurs after an interval averaging 4 (3–5) days. The majority of adult males appear after the 4th moult ; of females after the 5th. The coxal fluid (which seems to be remarkably copious) is secreted a few minutes after repletion, and in all the nymph stages as well as by the adult. A female may be fertilized several times in succession, and by several males—the author having observed females with 3 and 4 spermatophores attached—and may be fertilized after laying several batches of eggs. The term between successive meals and the succeeding parturitions averaged 8 (6–13) days. The female occupies on an average 7 (2–12) days in laying a batch of eggs. She does not leave the eggs after parturition until a good many have hatched, and thus larvae and even nymphs may be widely dispersed by her when she moves off.

Throughout these interesting experiments the ticks in all stages were lodged in open unplugged tubes containing a little sand, the tubes being kept in large jars having a little slightly moist cotton-wool in the bottom, and the jars stored in an incubator at 29·5°–30° C. When feeding the ticks (on the ear of a rabbit) exposure to light makes them slow to bite.

A. A.

Bequaert (J.). **Un Hyménoptère Béthylide qui pique l'homme dans les habitations au Congo.**—*Ann. Soc. Belge de Méd. Trop.* 1924. Nov. Vol. 4. No. 2. pp. 163–165. [2 refs.]

Records the observation that little wasplets of the genus Scleroderma frequently sting man in Leopoldville. The same observation has been made of other species of the cosmopolitan genus Scleroderma in other parts of the world. [Scleroderma is placed in the Proctotrypid family of the Hymenoptera Parasitica ; the female, which possesses the sting, is wingless.]

A. A.

Goodwin (E. St. G. S.). **The Cockroach. I. Considered as a Possible Disseminator of Disease. II. Methods of Eradication.**—*Jl. Roy. Nav. Med. Serv.* 1925. Jan. Vol. 11. No. 1. pp. 23–30. [15 refs.]

It is proverbial that a sailor can do anything, and Commander Goodwin in transforming an object of aversion into an object of grace-

ful literary art has well upheld the invincible traditions of the Navy. He does not tell us anything new about the cockroach and its insanitary ways or about methods devised for its destruction, but he gives us the old story very fully and in a new and rare investment of erudition and humour. His own experience relates to the ship cockroach, against which, he says, sodium fluoride is useless in the moist sea atmosphere. The primitive method of burning brimstone in open pans is also useless in a ship ; but sulphur fumigation with the Clayton apparatus if twice repeated, at intervals of 14 and 28 days respectively, so as to smite any young insects hatching from the very resistant egg-capsules, he is quite satisfied with, at any rate for ships-of-war. The author happily reminds us that Ulysses [Odyssey, Book 22, lines 92–94] used fire and brimstone for cleansing his ancestral halls after the slaughter of the suitors.

A. A.

Takahashi (R.). **Life-History of Blattidae.**—*Dobutsugaku Zasshi* [*Zool. Mag.*]. 1924. May. Vol. 36. No. 427. pp. 215–230.

The following observations of the life-history of the large red cockroach (*Periplaneta americana*), made in the tropical climate of Formosa, may be extracted.

The adult female may live 13 to 25 months, and may produce 25 to 71 egg-capsules, each containing 16 eggs. The egg may hatch in 19 to 70 days. The period of growth from new-hatched larva to adult may take 8 to 19 months.

A. A.

Larrousse (F.). **Deux nouveaux cas de larves de névroptères éventuellement hématophages.**—*Ann. Parasit. Humaine et Comparée.* 1924. Oct. Vol. 2. No. 4. p. 354. [2 refs.]

After noticing that Blanchard and also Krohn have recorded of larvae of the Neuropterous family Hemerobiidae that they may attack man and suck blood, the author gives his own observations corroborative of the fact. At Arradon, Morbihan (Brittany) he caught several Hemerobiid larvae *flagrante delicto*. The bite is painful and itches for several hours. The author also reports another ample confirmation from a correspondent elsewhere.

A. A.

Strickland (C.). **On Spider-Lick, a Dermatozoosis.**—*Indian Med. Gaz.* 1924. Aug. Vol. 59. No. 8. pp. 385–387. With 5 figs. [2 refs.]

" Spider lick " is the name popularly bestowed on a sudden and painful dermatitis of common occurrence in India and vaguely and mysteriously attributed to spiders. From observations of intelligent correspondents and from his own experiments Strickland is able to explain that it is caused by the blistering secretion of a Staphylinid beetle, *Paederus fuscipes*. [The genus *Paederus* is widely distributed, and others of its species are notoriously troublesome in the same way in certain parts of South America and of the Malay Archipelago.]

A. A.

CULPEPPER (M. B.). **My Experience with Tarantula Bites.**—*Southwestern Med.* 1924. Oct. Vol. 8. No. 10. pp. 499–500.

Four cases of "tarantula" bite at Carlsbad, in New Mexico. Their common phenomena were (1) insignificant local reaction; (2) pain, ensuing after some hours delay, but then gradually spreading all over the body, smiting particularly the bones, cramping the heart, obstructing the breathing, and culminating in agony; (3) slow abatement of symptoms, despite anodyne treatment; (4) prolonged incapacity—in one case extending to the 30th day. In one case, where the patient came for treatment within two hours and received local subcutaneous injections of a half-per cent. solution of permanganate of potash, the symptoms were very slight and recovery was complete in two or three days.

A. A.

ROSS (I. Clunies). **The Bionomics of *Ixodes holocyclus* Neumann, with a Redescription of the Adult and Nymphal Stages and a Description of the Larvae.**—*Parasitology.* 1924. Dec. Vol. 16. No. 4. pp. 365–381. With 1 plate & 2 text-figs. [7 refs.]

A careful description of *Ixodes holocyclus*—a three-host tick—in all its stages, and of its life-cycle as observed in the laboratory. This tick, which occurs along almost the whole coastal region of E. Australia, is the cause of a paralysis extremely common and fatal to dogs and cats and also of occasional occurrence in children and young stock; a common host, in Nature, is the bandicoot (Perameles). The eggs of this tick hatch in 49–61 days in warm weather. The larvae remain attached to their host for 4–6 days, and (in warm weather) complete their development into nymphs in 19–41 days. The nymphs remain attached to their host for 4–7 days, and (in warm weather) complete their development into the adult stage in 21–71 days. The adult females remain attached to their host for 6–21 days. Males are rarely seen on a host, and have never been found attached or showing signs of engorgement. All stages of the tick soon succumb to desiccation. Under the most favourable conditions of climate and facilities of attachment to suitable hosts, two complete generations might be fulfilled in a year; but with such conditions unfavourable more than a year might be required for the maturation of a single generation.

A. A.

FERGUSON (E. W.). **Deaths from Tick Paralysis in Human Beings.**—*Med. Jl. Australia.* 1924. Oct. 4. 11th Year. Vol. 2. No. 14. pp. 346–348. [10 refs.]

The author gives a full account of one recent case and short abstracts of seven other previously observed cases of death from tick-bite paralysis in Australia. The recent case now recorded was a boy of 16 months who died 2 days after admission to hospital. He had not been well for a month, and 3 days before admission suddenly became unable to stand; after admission he lapsed into a state of coma and generalized paralysis. A tick (*Ixodes holocyclus*) not quite half replete was discovered in his scalp just before death. At autopsy nothing was obvious to the naked eye, but some inflammation at site of bite. Microscopic sections of cord and various parts of brain showed intense congestion. Two rabbits inoculated intracranially with emulsion of

brain or cord were unaffected. Two of six mice inoculated subcutaneously or intraperitoneally died, but their death might have been attributable to the intervention of staphylococcus.

Of the seven cases collected from the records one was a girl of about 13 or 14 years and all the others were young children. In every case only one tick was found attached, the site of attachment usually being on the head or neck (twice inside the auditory meatus), in one case on the chest. In one case there was no paralysis and death was attributed to toxaemia.

The author thinks it pretty certain that the common scrub tick, *Ixodes holocyclus*, is responsible in all fatal cases of tick-bite paralysis in human beings in Australia.

A. A.

i. Moss (H. St. Leger). **A Case of Tick Paralysis.**—*Med. Jl. Australia*, 1924. Nov. 22. 11th Year. Vol. 2. No. 21. p. 556.

ii. Ferguson (Eustace W.). **A Case of Tick Paralysis.** [Correspondence.]—*Ibid.* Dec. 20. No. 25. p. 672.

i. The patient, a lady, complained of sharp pain in the legs of ten days' and blurred vision of two days' duration. A small abscess on the labium—not supposed by her to be connected with the main complaint—was found to be due to the attachment of a bloated tick; complete recovery soon followed its removal.

ii. The tick concerned in the above case has been identified by this writer as *Ixodes holocyclus*, a species locally responsible for paralysis in dogs.

A. A.

Walch (E. W.). **On Pseudo-Typhus of Sumatra. Part I. On Larvae and Nymphae of Sumatra Trombiculae, including two Carriers of the Disease. Part II. Some Notes on Epidemiology.** [Walch (E. W.) & Keukenschrijver (N. C.).]—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress, Singapore, 1923.* pp. 583–626. With 37 text figs. [15 refs.] pp. 627–643. With 1 plate. [11 refs.]

Walch's work on the Trombicula mites of Sumatra has been noticed in the *Bulletin* (Vol. 20, p. 473 & p. 800; Vol. 21, p. 790); he and his colleague now develop the argument that *Trombicula deliensis*, as the only mite addicted equally to rat and man in tracts where Sumatran pseudotyphus is truly endemic, must be the responsible carrier of the virus—the rat being, as they suppose, a natural reserve of the disease. (In an established epidemic other species, particularly *T. schuffneri*, may be carriers of infection between human beings). In a recent epidemic in some young rubber estates, much overgrown with weeds, and sheltering rats infested with *T. deliensis*, the climax of the epidemic synchronized with the months (May–June) when the largest numbers of this species of mites were to be found on the individual coolies weeding the estates. From the fact that a coolie, upon whom a mite had been taken *flagrante delicto*, exhibited an ulcer and the symptoms of pseudotyphus three weeks afterwards, the incubation period is concluded to be "somewhat long." Rats experimentally infected showed no reactions except enlargement of spleen; and an abnormally large number of rats with enlarged spleen having been captured in the area of the

epidemic is therefore held to justify the conclusion that the epidemic originated in naturally infected rats. Experimentally, the infection could be transmitted, but not with certainty, by inoculation from man to gibbon, and directly to gibbon by injection of infected mite-squash. During the epidemic the mite (*T. deliensis*) was found on certain wild birds, and this may explain how the infection may be spread naturally from island to island.

A. A.

i. Lynch (Kenneth M.). **Notes on the Natural and Cultural Growth of Certain Intestinal Flagellates.**—*Amer. Jl. Trop. Med.* 1924. Nov. Vol. 4. No. 6. pp. 537–545. [16 refs.]

ii. de Mello (Froilano). **Note sur les formes actives d'une thécamèbe, parasite fréquent de l'intestin des indigènes d'Angola.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a. e 8a. Sessões.) 1923. Aug. No. 4. pp. 397–400. With 1 plate.

iii. Jacob (Erich). **Die Verwandtschaftsbeziehungen der Zeckengattungen. Versuch eines natürlichen Systems auf vergleichend-morphologischer Grundlage.**—*Parasitology.* 1924. July. Vol. 16. No. 3. pp. 313–316.

iv. Florence (Laura). **An Intracellular Symbiont of the Hog Louse.**—*Amer. Jl. Trop. Med.* 1924. July. Vol. 4. No. 4. pp. 397–409. With 2 plates. [16 refs.]

v. Wing (H. E.). **Sucking Lice of Jack Rabbits.**—*Ibid.* Nov. Vol. 4. No. 6. pp. 547–551. [1 ref.]

vi. Southwell (T.). **On a Collection of Linguatulids in the Liverpool School of Tropical Medicine.**—*Ann. Trop. Med. & Parasit.* 1924. Dec. 30. Vol. 18. No. 4. pp. 515–531. [5 refs.]

vii. Korobkowa (E.) & Sherishorina (S.). **Bacteriological Means of Fighting Rodents. Increase in the Virulence of Bact. Danysz.**—*Rev. Microbiol. et Épidemiol.* Saratov. 1924. Vol. 3. No. 3. In Russian pp. 143–146. [6 refs.] English summary pp. 218–219.

viii. Delanoë (P.). **Du nombre des mamelles chez le Rat d'Alexandrie, *E. rattus* var. *alexandrinus* G.**—*Bull. Soc. Path. Exot.* 1924. July 9. Vol. 17. No. 7. pp. 589–590.

i. These notes, if discursive, are interesting. They do not contain any new formulae or describe any novel methods.

ii. Describes and figures *Chlamydophrys stercorea* as observed in 4 of 39 enteritis cases in Angola.

iii. Prospectus of an essay on the inter-affinities of the genera of ticks.

iv. Contains, besides descriptive matter, a useful review of the general subject, with references to original papers.

v. The sucking lice of jack rabbits are of interest in connexion with the transmission of tularaemia between these animals. The species observed by the author are *Haemodipsus ventricosus* and *H. piliferus*—the latter a new species here described—and *Linognathus piliferus*, the common dog-louse.

vi. A useful taxonomic paper.

vii. The virulence of Danycz rat-virus soon decreases, even when passed through rats; but the author finds that it is increased by admixture of *Bacillus proteus vulgaris*—1 part of the latter to 2 of the former.

viii. *Mus rattus* var. *alexandrinus* as observed at Mazagan may possess 4, or 6, or more frequently 5 mammae.

A. A.

i. Anderson (T. J.). **Ectoparasites recorded from Kenya Colony and Protectorate, with their Hosts.**—*Kenya Med. Jl.* (Supplement No. 2). 1924. Sept. 8 pp.

ii. Williams (C. B.). **An Improved Light Trap for Insects.**—*Bull. Entom. Res.* 1924. Aug. Vol. 15. Pt. 1. pp. 57–60. With 2 figs.

iii. Cooling (L. E.). **A Synonymic List of the More Important Species of Culicidae of the Australian Region.**—*Commonwealth of Australia Dept. of Health. Service Publication (Tropical Division) No.* 2. 1924. 61 pp.

iv. Ingram (A.) & Macfie (J. W. S.). **The Mosquitos of Accra.**—*Ann. Trop. Med. & Parasit.* 1924. Oct. 31. Vol. 18. No. 3. pp. 263–264.

v. Hatori (Jyuro). [**Supplement to Anopheles Distribution in Formosa.** *Anopheles naniwa,* **n.sp.**]—*Taiwan Igakkwai Zasshi (Jl. Formosan Med. Soc.* 1923. Nov. No. 231. [Summarized in *Japan Med. World.* 1924. Mar. 15. Vol. 4. No. 3. pp. 74–75.]

vi. Wright (W. Rees). **On the Hibernation of Adult Mosquitos.**—*Ann. Trop. Med. & Parasit.* 1924. Dec. 30. Vol. 18. No. 4. pp. 619–627. [16 refs.]

vii. Kudo (R.). **Studies on Microsporidia parasitic in Mosquitoes. VI. On the Development of** *Thelohania opacita,* **a Culicine Parasite.**—*Jl. Parasit.* 1924. Dec. Vol. 11. No. 2. pp. 84–89. With 1 plate & 1 fig. [7 refs.]

viii. Sinton (J. A.). **Notes on Some Indian Species of the Genus Phlebotomus. Part IX.** *Phlebotomus simillimus* **var.** *hospitii* **nov. var.**—*Indian Jl. Med. Res.* 1924. Oct. Vol. 12. No. 2. pp. 261–271. With 1 plate. [3 refs.]

ix. Legendre (J.). **Sur l'existence de** *Phlebotomus perniciosus* **en Saintonge.**—*Bull. Soc. Path. Exot.* 1924. Dec. 10. Vol. 17. No. 10. pp. 894–896. [1 ref.]

i. A very useful record.

ii. "It must be emphasized" that this trap is meant for obtaining insects in good condition for study; not for the wholesale destruction of troublesome insects.

iii. The author is to be congratulated upon the accomplishment of this most useful piece of work; though only a zoologist can realize the amount of distasteful and intractable labour involved in its fulfilment.

iv. A list of 68 species found within the municipal limits of Accra (Gold Coast).

v. The "n.sp." of the title is stated in the text to be identical with *A. aitkeni.*

vi. Some observations on the hibernation of *Anopheles maculipennis, Culex fatigans,* and *Theobaldia annulata.*

vii. The microsporidian here described and figured in all stages of schizogony and sporogomy is observed to be a mortal infection in certain species of Culex.

viii. *P. simillimus* is a West African species described by Newstead; the new variety here described was found by the author in Kashmir at an altitude of 2,023 feet.

ix. Observation of *Phlebotomus perniciosus* in the Department of Charente-Inférieure.

A. A.

LABORATORY METHODS.

GORDON (A. Knyvett). **A Useful Stain for Blood Films.**—*Lancet.* 1925. Jan. 17. p. 127.

The following stain is recommended for the staining of blood films, in which it is necessary to bring out the granules characteristic of different types of calls.

The composition of the stain is: Eosin-methylene blue, 0·02 gm.; eosin-methylene-violet, 0·02 gm.; methyl alcohol (pure), 25 cc. The film is flooded with undiluted stain for one minute, then an equal part of distilled water is added, and the diluted stain allowed to act for three minutes, followed by distilled water for about two minutes. The film is then dried and mounted either in neutral Canada balsam, or, preferably, in green Euparal, which improves the definition of the granules, and is also not so liable to cause fading of the specimens.

This single process stain is said to give results indistinguishable from those obtained with the panoptic method.

E. Hindle.

EPSTEIN (H.). **Weiterer Beitrag zur Blut- und Blutprotozoenfärbung (Toluidinblau-Eosin).** [Additional Observations on the Staining of Blood and Blood-Protozoa.]—*Cent. f. Bakt.* 1. Abt. Orig. 1924. June 16. Vol. 92. No. 1–2. pp. 148–150. [3 refs.]

The following method is recommended :—

Films are fixed in the ordinary way and then stained with the film side downwards, for 15 to 60 minutes, in a Petri dish, with a mixture of equal parts of two solutions. The first solution is made by dissolving 1 gm. of Toluidin Blue (Hoyer) and 1 gm. of lithium citrate in 100 cc. distilled water and filtering. The second is a 0·016 per cent. aqueous solution of Eosin B.A. The strength of the latter may be varied between 0·01 and 0·03 per cent. according to the requirements. After staining the films are washed under the tap and dried with filter paper.

E. H.

WILLIAMS (B. G. R.), assisted by WILLIAMS (E. M.), TIBURTIA (Sr. M.) & DRUMMY (Margaret). **Further Studies with Cresylecht Violet, including a Report of my Six-Second Method for Staining Tissues.**—*Jl. Lab. & Clin. Med.* 1925. Jan. Vol. 10. No. 4. pp. 312–315. [1 ref.]

The only Cresylecht Violet found to be any use was one supplied by the National Aniline and Chemical Co., Inc., U.S.A. A concentrated solution of the stain in strong formalin is employed and it is essential to use a formalin that does not contain methyl alcohol.

The stain can only be used for frozen sections of unfixed material, or tissues in 10 per cent. formalin. The sections are covered with the undiluted solution of the stain for about six seconds and then washed in a dish of water and at once examined under the microscope. The author claims that it is far superior to polychrome methylene blue for metachromasia, and strongly recommends its use for pathological diagnoses. It cannot be employed for permanent mounts, but preparations in laevulose will keep their colour for a few days.

E. H.

TWORT (Frederick W.). **Further Modifications in the Preparation of Neutral Red–Light Green Double Stain, and an Improved Method of Embedding Tissues in Paraffin.**—*Brit. Jl. Experim. Path.* 1924. Dec. Vol. 5. No. 6. pp. 350–351. [1 ref.]

A modification of the method previously described [see this *Bulletin*, Vol. 21, p. 810] recommending the use of 60 per cent. normal propyl alcohol as a solvent for the stain instead of ethyl alcohol.

About 1 gm. of the solid dye is ground up with 100 cc. of the solvent and the solution filtered and kept in a stoppered bottle. When required for use it is mixed with an equal volume of water. 60 per cent. allyl alcohol may also be used as a solvent and produces the most dense and rapid staining solution. A saturated solution of butyl alcohol in distilled water will also dissolve the stain, producing a solution of use for demonstrating fine cellular structure. All the staining solutions stain more densely when used hot. A denser and faster stain is obtained by the addition of 1 per cent. or more of phenol, except in the case of butyl alcohol. With dry films, better results are obtained by treating them, after fixation, with such solvents as xylol, chloroform, or soft soap dissolved in 60 per cent. alcohol.

When preparing tissues for embedding in paraffin it is possible to eliminate the use of xylol, etc., by employing butyl alcohol both as a dehydrating and clearing agent, as it mixes well with both 50 per cent. ethyl alcohol and melted paraffin. The tissues after fixation are passed into 60 per cent. ethyl alcohol and then into pure normal butyl alcohol for 2 to 3 hours, during which the liquid is changed several times. They are then passed through changes of paraffin in the usual manner.

The author states that the tissues treated in this manner remain soft and show very little, if any, shrinkage. Moreover, the cellular structure remains free from distortion and contraction.

E. H.

PROESCHER (Frederick) & KRUEGER (Albert Paul). **A Simple and Rapid Method for the Preparation of Polychrome Methylene Blue and Thiazin Red.** [Methylen-azur.] **A Rapid Method for Staining Frozen Sections with Thiazin Red.**—*Jl. Lab. & Clin. Med.* 1924. Nov. Vol. 10. No. 2. pp. 153–159. [11 refs.]

Any good commercial brand of methylene blue, preferably *medicinale*, may be used for the preparation of the polychrome methylene blue. A 1 per cent. solution is prepared either in water, alcohol, acetone, or chloroform. 20–30 milligrams of sodium peroxide is then added to each 100 cc. and the mixture at once either boiled over a flame for 5 minutes, or placed in a water-bath at 100° C. for 15 minutes. If a neutral solution is desired, the free alkali may be neutralized by adding N/10 HCl (5 mg. Na_2O_2 require 1·18 cc. N/10 HCl). The solution should be kept in a paraffined bottle; otherwise the alkali is liable to dissolve out of the glass.

Since the specific staining of this solution depends on the presence of thiazin reds, these may be isolated as follows. 50 gms. methylene blue are dissolved in 200 cc. water and the solution heated to 75°–80° C. 5 gms. sodium peroxide are dissolved in 20–30 cc. water, and added to the warm solution. Immediately the thiazin reds are precipitated and can be removed by filtering the cooled solution through a Buchner funnel and drying the precipitate at 37° C. After 24 hours the large lumps should be broken up in a mortar, and the compound dried again and finally desiccated over calcium chloride or concentrated sulphuric acid. A suitable staining solution may be prepared by dissolving 0·5 gm. of the dried precipitate in 100 cc. distilled water.

For the staining of frozen sections a solution in 1 per cent. acetic acid is recommended. 10 to 20 seconds in the staining bath is quite sufficient; then wash in water and mount in glycerine or laevulose syrup.

E. H.

MARIE (Stanley U.) & RALEIGH (Joseph T.). **The Use of Ultra-Violet Rays for the Polychromization of Methylene Blue.**—*Jl. Lab. & Clin. Med.* 1924. Dec. Vol. 10. No. 3. p. 250.

Dissolve 1 gm. of methylene blue in 100 cc. of a 0·5 per cent. solution of sodium bicarbonate in distilled water. Then expose the mixture in a shallow dish, to the ultra-violet rays from an ordinary arc lamp or similar source of light, for a period of ten to thirty minutes. When the mixture is cool, add slowly 500 cc. of a 0·1 per cent. yellowish eosin solution, when a fine black precipitate is formed. Filter off this precipitate and allow it to dry; then dissolve 0·1 gm. of the dry powder in 60 cc. of acetone-free methyl alcohol.

E. H.

CONN (H. J.). **Certified Stains—What they are, and how to obtain them.**—*Jl. Lab. & Clin. Med.* 1925. Jan. Vol. 10. No. 4. pp. 321–322.

In the U.S.A. the difficulty of obtaining reliable biological stains has been met by the appointment of a "Commission on Standardization of Biological Stains." This Commission tests batches of stains submitted to it and then furnishes a special label bearing the statement "Found satisfactory by Commission . . ., etc. for {above mentioned purposes / purposes mentioned on main label.} Use for other purposes not contra-indicated unless specifically so stated {above / on main label}."

The following stains have been put on a certification basis: Methylene Blue; Basic Fuchsin; Acid Fuchsin; Haematoxylin; Safranin O, and Pyronin. The following companies have received certification for some or all of these stains: Empire Biochemical Co.; Hartman-Leddon Co.; MacAndrews and Forbes; National Aniline and Chemical Co.; and Providence Chemical Laboratories.

E. H.

POPOFF (Peter). **An Attempt at growing Pathogenic Protozoa by the Method of Collodion Sacks.**—*Jl. Trop. Med. & Hyg.* 1924. Sept. 15. Vol. 27. No. 18. pp. 247–248.

In order to cultivate malaria parasites the author mixes the defibrinated blood containing the organisms with 50 per cent. dextrose solution and puts the mixture into collodion sacs, which are then placed in large test-tubes or U-tubes containing normal saline, Ringer's, or Lock's solution. 50 per cent. dextrose solution is added to the blood mixture every four hours and also the saline or Lock's solution changed after the same interval. As a result the toxins produced in the cultures diffuse through the walls of the sacs and are removed, and in addition the food supply is easily renewed. The cultures are kept at 37°–39° C. or even 41° C. The method has been employed for other parasites, including *Trichomonas intestinalis* and Sarcosporidia, and the author recommends its general use for the growth of pure cultures of pathogenic protozoa.

E. H.

GRUHZIT (O. M.) & CLARK (L. T.). **A New Clinical Method for Blood Typing.**—*Jl. Lab. & Clin. Med.* 1924. Oct. Vol. 10. No. 1. pp. 66–68. With 2 figs. [6 refs.]

A simple method of testing the blood group of a patient, which can be performed by physicians at any place irrespective of laboratory facilities.

The two standard sera are contained in bent capillary tubes of the shape figured below (Fig. 1), and in order to avoid confusion the sera are put in different coloured capillaries. Before puncturing the patient's ear or finger, the tip of the empty end of the capillary is broken off, and then the tip of the end containing the serum. Then a rubber bulb, with a hole in it, which can be closed by the thumb of the operator, is placed on the empty end of the capillary. The second capillary is prepared in a similar manner. Then prick the patient's ear or finger, squeeze out a minute drop of blood and touch it for an instant with the ends of the capillaries containing serum. The smaller the quantity of blood, the better.

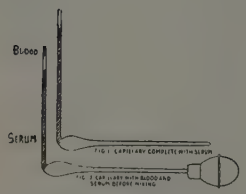
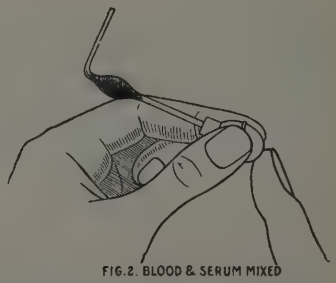


Fig. 1.



Illustrating a new clinical method for blood typing.
[Reproduced from the *Journal of Laboratory & Clinical Medicine*.]

By means of the rubber bulb the blood and serum are then drawn into the spindle enlargement of each capillary, and then driven out again, the process being repeated until the cells and serum are thoroughly mixed. The capillaries are allowed to stand for five to ten minutes, then reagitated. If the contents appear granular and the flocculation increases on agitation, it is an indication of agglutination. If desired, the contents can be examined under a microscope, but this is unnecessary.

E. H.

GORÉ (S. N.). **A Simple Method of preparing a Series of Tenth Dilutions.** —*Indian Jl. Med. Res.* 1924. July. Vol. 12. No. 1. pp. 157–159. [1 ref.].

Two platinum loops are prepared, one 5 mm. and the other 1 mm. in diameter. Such loops take up approximately one-fortieth and one four-hundredth of a cubic centimetre of liquid, respectively, when biconvex loopfuls of liquid are removed.

The method of preparing tenth dilutions with these loops is as follows :—

Mark and serially arrange as many hollow slides as the number of required dilutions (for faeces three is usually enough) and by means of the 5 mm. platinum loop put one loopful of saline solution in each of the hollows in the slides. Then by means of the 1 mm. loop, remove a loopful of the faeces, or other material to be examined, and mix it well with the saline in the first hollow. This gives first tenth dilution. Without sterilizing the loop, remove a loopful from this first dilution and mix it with the drop of saline in the second hollow. This gives the second tenth dilution, and additional ones are prepared in the same manner.

Now sterilize the 1 mm. loop and take up a loopful from the last dilution and spread it well on an agar slope. Other inoculations are prepared in the same manner, but in reverse order, to obviate the necessity of sterilizing the loop after each inoculation. As the quantity of liquid spread on the agar slopes is very small (·04 cc.), it dries almost at once and therefore the tubes can be immediately plugged after inoculation and incubated.

The advantages of employing agar slopes instead of Petri dishes are twofold : less than a quarter of the amount of culture media is required, and the test-tubes can be stored for long periods without having to be prepared fresh or every day or two—as is the usual case in the tropics with media in Petri dishes.

E. H.

Shanks (G.). **A Note upon Routine Blood Cultures.**—*Indian Med. Gaz.* 1924. Nov. Vol. 59. No. 11. pp. 557–559.

The author recommends the routine practice of making a culture of the blood in all febrile cases at or near the time of onset of the fever.

The cultures are made in flasks containing 50 cc. of 2 per cent. glucose broth with 1 per cent. sodium citrate ; 10 cc. of blood are removed from the patient, of which 7 cc. are added to this medium, and the other 3 cc. kept for agglutination reactions. A table is given indicating the nature of the bacteria found in 65 cultures, and the conditions in which they were obtained, from which the diagnostic value of the method is evident.

E. H.

Brown (H. C.), Duncan (J. T.) & Henry (T. A.). **The Fermentation of Salts or Organic Acids as an Aid to the Differentiation of Bacterial Types.**—*Jl. of Hyg.* 1924. Sept. Vol. 23. No. 1. pp. 1–22. With 2 plates. [12 refs.]

The identification of certain types of bacteria by the "sugar reactions" is unreliable or breaks down in some cases, *e.g.*, the *Salmonella* group, and in dealing with such cases the authors recommend the substitution of certain organic salts for sugars. Another advantage of their use is the fact that they are cheaper and more easy to obtain pure than the rarer sugars, such as inositol and trehalose. A large number of organic salts were tested with various bacteria, but the reaction changes and production of gas were not sufficiently constant to form a reliable diagnostic criterion for the differentiation of bacterial types. In the majority of cases the enhancement or inhibition of growth bears a definite relation to the utilization of the

salt by the bacteria. This furnishes a useful differential test for certain organisms when citrates are used, but cannot be applied in the cases of all salts.

The bacterial decomposition of the salts of those organic salts that form insoluble lead compounds can be demonstrated by the addition of lead acetate to the culture. By the use of the sodium salts of six organic acids (viz., citric, d-tartaric, l-tartaric, m-tartaric, fumaric and mucic), seven different groupings of the common *Salmonella* types can be obtained, whereas the sugar reactions up to the present have given only four groupings.

In addition, the organic salts form an easy method of distinguishing between some of the members of the *coli-aërogenes* group, and also between *B. diphtheriae* and Hofmann's bacillus, as well as between *B. mallei* and *B. whitmori*.

These six organic salts are relatively inexpensive, can easily be obtained pure, and also will stand sterilizing by the autoclave.

The nature of the decomposition products in the case of citric acid in the presence of *Bacillus suipestifer* was found to be acetic acid, carbonic acid and succinic acid. In the case of fumaric acid the acid seems to be converted into succinic acid by direct reduction, and an analogous reaction takes place in the case of maleic acid.

From the authors' experiments it seems that simple aliphatic monobasic and dibasic acids, with the exception of formic, are not readily decomposed by the bacteria investigated, and this is also true of monohydroxy-carboxylic acids. Readiness of decomposition is first shown by the tartaric acids and is at its best in citric acid.

E. H.

Goré (S. N.). **A Simple Method for the Classification of Aerobic Bacilli growing well on Ordinary Laboratory Media and a Key for the Provisional Identification of Certain Aerobic Non-Spore producing Intestinal Bacilli and Vibrios.**—*Indian Jl. Med. Res.* 1924. July. Vol. 12. No. 1. pp. 161–177. [9 refs.]

A scheme for facilitating the classification and identification of aerobic bacilli and vibrios resembling the bacilli of the typho-colon group in their surface growth on agar. The organisms are divided up into six groups and forty-eight sub-groups, the classification being based on simple reactions obtained by culturing the bacteria in three media, viz., glucose peptone water, lactose litmus peptone water, and ordinary peptone water. The glucose and lactose cultures are examined for the presence or absence of partial or complete fermentation, the glucose culture being still further examined for the presence or absence of the carbinol (Voges Proskauer) reaction. The peptone culture is examined for the absence or presence of indol and of motility.

The bacilli are first divided into six main groups by means of their fermentation reactions and each of these split up into eight sub-groups by means of indol, carbinol and motility.

A mnemonic system is proposed for recording the characters thus obtained and gives diagnostic formulae for each group and sub-group. The negative characters are recorded by a zero, while the positive characters are recorded by letters. The partial and complete fermentation in glucose and lactose are indicated respectively by small (g)

and (l), and capital (G) and (L); while the letters for indol, carbinol, and motility are capital (I), (C) and (M) respectively.

Thus the six main groups are as follows :—

(O) Bacilli which do not ferment glucose (O) and lactose (O).
(g) Bacilli which partially ferment glucose (g) but not lactose (O).
(gl) Bacilli which partially ferment both glucose (g) and lactose (l).
(G) Bacilli which completely ferment glucose (G) but not lactose (O).
(Gl) Bacilli which completely ferment glucose (G) and partially ferment lactose (l).
(GL) Bacilli which completely ferment glucose (G) and lactose (L).

The letters for the sub-group reactions are added to the above, giving in all 48 formulae. Thus, GICM would indicate that the organism completely ferments glucose (G), but not lactose, and, in addition, gives positive indol (I) and carbinol (C) reactions, and is motile (M). Tables are given of the micro-organisms belonging to each of the six groups, showing their sub-group formulae and other important reactions, from which it is very easy to obtain an identification of the bacillus under examination.

[Various schemes of classification have been proposed, such as Chalmers and Macdonald's (1916), Castellani and Chalmers' (1918) and Khaled's (1923), but the one outlined above seems to be the most satisfactory that has been put forward.]

E. H.

Cunningham (J.) & Raghavachari (T. N. S.). **Recent Methods of Differentiating Lactose Fermenting Organisms, as applied to Indian Conditions.**— *Indian Jl. Med. Res.* 1924. July. Vol. 12. No. 1. pp. 75–81. [20 refs.]

The authors have studied the coliform bacteria found in human and bovine faeces, and also in a large series of samples of unfiltered water from various parts of the Madras Presidency, with the object of finding some classification which will afford evidence of the origin of such organisms in water. The methyl red (M.R.) and Voges Proskauer (V.P.) tests were employed, and the results of the examination of a very large number of lactose fermenting bacilli by these methods are given in tabular form, the organisms being classified as either low ratio (M.R.+V.P.−) or high ratio (M.R.−V.P.+) groups.

With regard to human faeces, 960 cultures taken from 91 stools were examined, and the percentage of the high ratio group was found to be 2·1, the figures from non-vegetarian and vegetarian sources, respectively, being 0·4 and 4·6. In bovine faeces the high ratio group forms 0·5 per cent. of the lactose fermenting organisms.

In unfiltered water, out of 2,455 cultures from 245 samples, 29·8 per cent. of the lactose fermenting bacteria belong to the high ratio group, and there is no substantial difference in the distribution of the two groups if the samples are divided according to their source (Rivers, surface water, springs, wells, etc.). These results agree with those obtained by other observers in different parts of the world, but up to the present this grouping method has not furnished any clue as to the probable source of organisms found in water.

E. H.

CASTELLANI (Aldo) & TAYLOR (Frank E.). **The Identification of Glycerol by a Bacterial Method.**— *Jl. Trop. Med. & Hyg.* 1924. Oct. 15. Vol. 27. No. 20. pp. 271–273. With 3 figs. [8 refs.]

An application of the authors' method of employing various strains of bacteria and fungi, with different fermenting properties, for the identification of various carbon compounds. The present article is mainly concerned with the identification of glycerol, but, in addition, a table is given showing the organisms employed for the determination of the following compounds: glucose, levulose, maltose, galactose, saccharose, inulin, and inositol. The results are stated to be relative, and "not absolutely certain"; it is essential to use only selected strains of the organisms with constant characteristics and producing a large amount of gas.

E. H.

GORÉ (S. N.). **A Simple Method for detecting and estimating Indican in the Urine by Means of the Cotton-Wool Plug Test.**— *Indian Med. Gaz.* 1924. Aug. Vol. 59. No. 8. pp. 393–396. [4 refs.]

The author recommends a cotton-wool plug technique in place of Obermeyer's test for the detection of indican in urine. The author's method has been compared with Obermeyer's and found to be quite as accurate, in addition to being simpler, more rapid and economical, and independent of drugs taken by the patient. 2 cc. of the urine to be tested are put in a small test-tube (5 in. by $\frac{3}{4}$ in.) fitted with a white cotton-wool plug.

The plug is removed and moistened with a drop or two of a 1 per cent. solution of potassium persulphate in distilled water, followed by a drop of the following solution: p-dimethyl-amido-benzaldehyde 1 gm, absolute alcohol 95 cc., concentrated hydrochloric acid 20 cc. The moistened plug is then replaced and the urine boiled intermittently for about a minute. The presence of indican is shown by the development of a pink colour on the cotton wool. By diluting the urine with water to $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ dilution, etc., and repeating the test, an indication is obtained, correct to within 5 per cent., of the amount of indican present, for the smallest quantity that will give a positive reaction with this test is 0·0005 mgm. of indol-equivalent per cc., and it is only necessary to multiply this figure by the last dilution which gives a positive reaction. For example, if an $\frac{1}{8}$ dilution is the highest that gives a positive reaction the indol-equivalent of the indican present in the urine would be $0{\cdot}0005 \times 8 = 0{\cdot}004$ mgm. per cc. of urine.

E. H.

NEWHAM (H. B.), WILTSHIRE (H. G.) & SCHARFF (J. W.). **The Estimation of Haemoglobin.**— *Jl. Roy. Army Med. Corps.* 1924. Nov. Vol. 43. No. 5. pp. 359–365. [9 refs.]

A useful article on the various methods of estimating the amount of haemoglobin in blood. The usual practice is to employ one of the various colorimetric methods, but a comparison of the haemoglobin content of 30 patients estimated by the Gower, Haldane, Tallquist, and Fleischl haemoglobinometers, respectively, with the results obtained by Van Slyke's method of estimating the oxygen carrying capacity of the blood, showed in most cases serious discrepancies. All four haemoglobinometers were found to be unreliable, but as a

general rule the figures obtained by the colour methods were much lower than those with Van Slyke's method, and the authors consider that the commonly accepted standard of 100 per cent. representing 13·77 gms. of haemoglobin per 100 cc. of blood, as used in the above-mentioned instruments, is far too low. The normal standard seems to be about 108 to 110 per cent., equivalent to about 15 gms. of haemoglobin in each 100 cc. of blood, this figure being based on the examination of 14 healthy individuals.

The specific gravity is sometimes used as a measure of haemoglobin, but the measurement of 15 cases by this method showed some very marked differences from the results obtained by Van Slyke's.

The haemoglobin content was also found to vary (up to as much as 14 per cent.) in the same individual at different times of the day; consequently it is recommended that when making comparative estimations the blood should be collected at approximately the same hour on each occasion.

E. H.

Hughes (T. A.). **Observations on the Bilirubin Content of the Blood Serum.**—*Indian Jl. Med. Res.* 1924. Oct. Vol. 12. No. 2. pp. 403–408. [8 refs.]

Employing McNee's technique* the author has estimated the bilirubin content of 41 persons, 34 of whom were hospital patients. For comparison the urobilinogen in the urine was also estimated, both series of results being given in tabular form. The bilirubin content of normal serum was taken as 0·3 to 0·6 "van den Bergh" units (1 in 200,000). Four cases of hepatic cirrhosis with enlargement of the spleen and ascites showed the presence of latent haemolytic jaundice, but in addition more than half the patients showed a similar condition, probably as a result of latent malaria.

E. H.

Gilbert (Ruth) & Parsons (Ellsworth A.). **The Use of Defibrinated Blood preserved with Formaldehyde for the Purpose of controlling Dilutions of Dried Blood.**—*Jl. Lab. & Clin. Med.* 1924. Dec. Vol. 10. No. 3. pp. 206–207. [1 ref.]

In order to estimate the amount of blood in dried blood sent in for agglutination tests, it is necessary to dissolve it and compare the colour with blood of known dilution. The authors find that defibrinated sheep's blood, to which 5 per cent. formalin has been added in the proportion of 1 cc. to each 20 cc. of blood, may be used for preparing dilutions, and during a period of two weeks these compared satisfactorily with accurate dilutions of freshly drawn human blood. Another specimen remained satisfactory for a period of four weeks.

E. H.

Wallace (J. B.). **The Differential Leucocyte Count in a Sub-Tropical Climate.**—*Southern Med. Jl.* 1924. Nov. Vol. 17. No. 11. pp. 827–829. [3 refs.]

Tables are given illustrating the leucocyte count of 100 consecutive hospital cases in South Florida, Jenner's stain being employed. The

* *Quart. Journ. Med.* Vol. 16. p. 390.

results indicate that the normal polymorphonuclear percentage is decidedly lower than that usually given, the majority of cases having a percentage between 50 and 60, with extreme normal variations from 42 to 70 per cent. The average small lymphocyte percentage was usually from 30 to 40, with normal variations from 25 to 47 per cent. The average total number of leucocytes was 7,830.

[These results agree with others made in the United States, and suggest that EHRLICH's original figures show too high a percentage for the polymorphonuclears in normal blood.]

E. H.

EMRYS-ROBERTS (E., The late). **The Normal Differential Leucocyte Count in South African Natives, Chinese and Others.**—*Jl. Path. & Bact.* 1925. Jan. Vol. 28. No. 1. pp. 119–122. With 5 figs. [2 refs.]

A series of charts of the leucocyte counts of Africans, Chinese and British, illustrating the prevalence of polymorphonuclears, lymphocytes, large hyalines, eosinophiles and mast cells, respectively. The results support the author's view that the leucocyte counts may have an important bearing on anthropological research, for wide variations are observed between the different races. In the case of polymorphs the average percentage proportion was about 60–70 for British, 40–45 for Africans, and 38 for Chinese. The proportion of eosinophiles was identical in all three races (3 per cent.), but the other varieties of leucocytes all showed variations.

E. H.

STEWART (Marguerite). **Blood Transfusion as adapted for Use in India.**—*Jl. Assoc. Med. Women in India.* 1924. Aug. Vol. 12. No. 3. pp. 17–22.

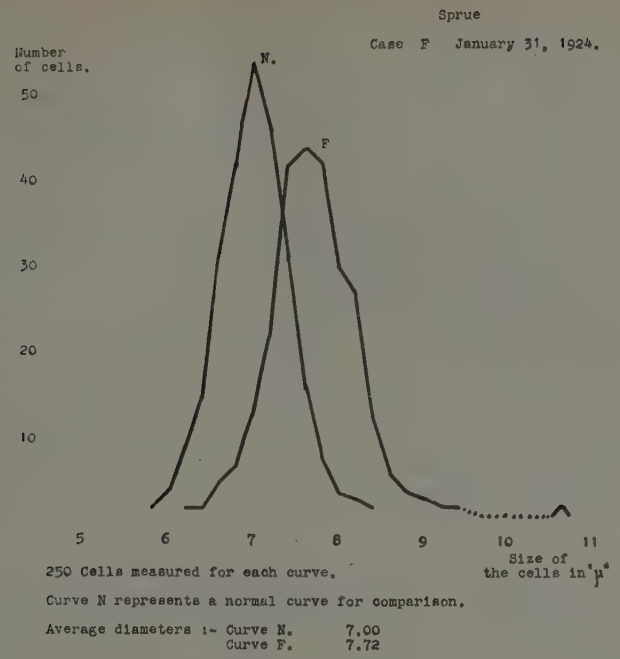
Contains an account of seven cases in which the indirect transfusion of citrated blood was performed, together with a description of the general technique. Owing to the difficulty of obtaining standard sera in India, the direct method of testing the compatibility of bloods was employed and found to be satisfactory. For Indian women, who usually have very small veins, the needles and canulae for the operation require to be of very small size.

E. H.

PASSEY (R. D.) & BRAINE (J. Carter). **Measurements of the Red Cells in the Anaemias of Sprue and *Dibothriocephalus latus* Infection.**—*Guy's Hospital Reports.* 1924. July. Vol. 74. (Vol. 4. 4th Ser.) No. 3. pp. 329–338. With 7 charts in text. [5 refs.]

The authors have measured the size of the red cells in five cases of sprue and four cases of infection with *Dibothriocephalus latus*, to see if they showed the megalocytic phenomena which PRICE-JONES has shown to be constant factors in the blood in pernicious anaemia.

The measurements of the red cells from the sprue patients showed a definite deviation from the normal in three cases and a slight deviation in the other two. The average mean diameters of the cells were 8·17μ, 7·72μ 7·89μ, 7·10μ and 7·40μ, respectively, as compared with a normal mean of 7·00μ.



Curve of Measurements of the Red Cells from a Sprue Patient compared with a Normal Curve.

[Reproduced by permission from *Guy's Hospital Reports.*]

In all four cases where the patients were harbouring the tape-worm, definite enlargement of the red blood corpuscles was demonstrated, and the cell distribution curves showed some widening of the base of the curve, together with a movement towards the right. Three of these cases were infected experimentally by swallowing the plerocercoid stage of the parasite and in these it was possible to measure the cells immediately after infection, during the experiment and at the end. In two cases measurements were also made several months later.

The increase in size of cells was as follows :—

Case 1 from 7·02μ at the beginning to 7·68μ at the end, returning to 7·18μ after fifteen months ; case 2 from 7·03μ at the beginning to 7·38μ at the end, returning to 7·00μ after 9 months ; case 3 increased from 6·96μ to 7·17μ ; and case 4 was 8·04μ when infected and 38 days after treatment returned to 7·66μ. No other blood changes were observed beyond those recorded above.

[Although the factor of diurnal variations in the size of the red blood cells was to some extent eliminated by the patients' blood being collected at the same time each day, it should be remembered that other factors are capable of producing these changes, such as violent exercise, forced breathing, etc. The experiments of PRICE-JONES*

* *Jl. of Path. & Bact.* 1920. Vol. 23. p. 370.

suggest that variations in the size of the red cells are due to differences in the reaction of the blood, an increase of acidity causing them to swell, whilst abnormal alkalinity has the opposite effect.]

E. H.

GIBBS (Charles S.). **An Improvised Autoclave for Hospital Laboratories.**—*China Med. Jl.* 1924. Nov. Vol. 38. No. 11. p. 920. With 2 figs.

The difficulty of heating autoclaves in a remote station in China was overcome by raising the stand by the addition of a strip of metal 3 inches wide and cutting a door in the stand in order to allow the introduction of an improvised fire-box. The latter was made by cutting off an old carbide tin 7 inches from the bottom. This tin was then filled with concrete except for a rectangular fire-box 4 inches by 6 inches, the grate of which was made by fitting $\frac{1}{4}$ inch steel rods into the concrete, about $\frac{1}{4}$ inch apart and 3 inches above the bottom of the tin. A $\frac{3}{4}$ inch tube was then forced through the concrete to open below the fire grate and connected at the other end with bellows. A charcoal fire was lighted and the fire-box placed underneath the autoclave. By means of the bellows the rate of the fire can be regulated, and the pressure of the autoclave can be raised to 30 pounds in 10 minutes, or 50 pounds in 15 minutes.

E. H.

REMLINGER (P.) & BEL (P.). **Inoculation des animaux par voie transorbitaire.**—*Arch. Inst. Pasteur de Tunis.* 1924. June. Vol. 13. No. 2. pp. 192–202. With 1 fig. [3 refs.]

The author describes the shape of the orbit in the following animals: dog, cat, horse, pig, sheep, goat, cattle, rabbit, guineapig, rat, fowl, frog and fish. In each case the shape is only considered from the point of view of introducing a needle into the optic foramen, in order to effect intra-cerebral injections without having to resort to trephining.

In the case of the rabbit this method of injection has been used for infecting them with rabies, but the results were not very satisfactory, owing to the fact that one is liable to mistake a foramen in the inter-orbital septum for the optic nerve, and therefore merely pass the needle into the opposite optic cavity when performing an injection. Employing guineapigs, in which there is no chance of this mistake, the intra-orbital method of injection with rabies gave 100 per cent. of infections.

When performing this operation an ordinary needle is employed, and it is essential to fix the head of the animal, as sudden movements after the introduction of the needle are liable to produce fatal injuries. The passage of the needle into the optic nerve might have been expected to produce some kind of injury to the sight, but the authors inoculated 0·5 to 1 cc. of 20 per cent. urotropine into a number of guineapigs every other day, alternately by the right and left orbits, and the animals showed no ill effects after ten injections. Moreover, careful examination with an ophthalmoscope failed to reveal any difference between an inoculated eye and a normal one.

Finally, the authors discuss the possibility of this method of inoculation being performed on man, especially for the introduction of medicaments, in the case of patients suffering from affections of the central nervous system, such as syphilis, sleeping sickness and encephalitis lethargica. Moreover, they recommend its use for the intra-cerebral injections of anti-tetanic and anti-meningococcic sera.

E. H.

LABORATORY REPORTS.

ASSAM. **King Edward VII. Memorial Pasteur Institute, Shillong. The Seventh Annual Report, for the year ending 31st December, 1923.** [GREIG (E. D. W.), Director.]—27 pp. 1924. Shillong: Govt. Press. [Price 12 annas.]

During the year 2,371 persons were treated for hydrophobia, of whom 22 died, 12 dying more than 15 days after completing the treatment. Accordingly, the total hydrophobia rate was 9·93 per cent. and failure rate 0·51 per cent. Particulars are given of the treatment of 84 cases of kala azar; 29 were treated by urea stibamine alone, 7 cases by tartar emetic and afterwards by urea stibamine, 2 cases with Bayer "205" and afterwards urea stibamine, 1 case with urotropine and afterwards tartar emetic, and 45 cases with tartar emetic alone. 65 of these patients were discharged as cured, urea stibamine being the most effective drug. Bayer "205" and urotropine were found to be useless.

Diphtheria. The examination of children at the European schools in Shillong by the Schick test was continued throughout the year, and all those found to be susceptible were immunized with toxin-antitoxin. This is a continuation of work begun last year (1922) by Major MACDONALD, I.M.S. (see this *Bulletin*, 1923, Supplement No. 3, p. 200), and its success is shown by the fact that during the present year no cases of diphtheria occurred in the schools. This is the first time since 1917 that they have been free from infection.

The throats of 242 children were examined by culturing swabs, and 16 were found to be carriers of *B. diphtheriae*, 4 being virulent and 12 non-virulent strains.

E. H.

BOMBAY. **Report of the Bombay Bacteriological Laboratory for the Year 1923.** [MACKIE (F. P.), Offg. Director.]—49 pp. With 3 charts. 1924. Bombay: Govt. Central Press. [Price As. 14 Ps. 6.]

A considerable part of this Report is concerned with plague and will be dealt with elsewhere.

With regard to the research work of the laboratory, most of the results have been published elsewhere and already received notice, but the following observations appear only in this report:—

Lt.-Col. F. P. MACKIE, I.M.S., and Dr. G. D. CHITRE, L.M. & S., examined the bodies of 27 *Mus rattus* and 23 *Mus decumanus*, without finding a single example of either *Spirochaeta* [*Leptospira*] *icterohaemorrhagiae* or *S. morsus muris*. In view of the prevalence of rat-bite fever in Bombay, these negative results are rather surprising.

Guinea-worm Disease. Dr. FAIRLEY has continued researches on Dracontiasis and gives some notes on the action of various digestive secretions on infected Cyclops. LEIPER'S observation of the stimulating action of hydrochloric acid on the embryos was abundantly confirmed, but the survival time was limited. In the presence of sodium bicarbonate and liquor pancreaticus the embryos showed normal motility, even after seven hours, so it is evident that they would be able to invade the gut wall after passing from the stomach into the duodenum or jejunum. Twenty-two monkeys (*Macacus sinicus*)

were subjected to different modes of infection with uniformly negative results after twelve to fourteen months, so this species seems to be naturally immune to guinea-worm disease. In conjunction with Major J. MORISON, I.M.S., a series of experiments were made to determine the best means of killing Cyclops in drinking water. Alum, copper sulphate and chlorine were unsatisfactory, but lime (1 lb. per 1,000 gallons) was found to be practicable.

Bilharziasis. Twenty-five cases of vesical bilharziasis (*S. haematobium*) from Mesopotamia, that had undergone a course of intravenous treatment with tartar emetic, after twelve months showed practically no change in their serological reactions, the anti-body still persisting. The majority of these cases showed no clinical relapse, but five continued to pass living ova in the urine.

The antigen prepared by making a concentrated alcoholic extract of the livers of *Planorbis exustus* infected with *Schistosoma spindalis* was found unchanged after storage for twelve months in an ice-chest.

This antigen gives a group reaction and can be used for detecting other forms of mammalian bilharziasis, including the three species infecting man.

The possibility of a serological classification for bilharzial cercariae is suggested by the fact that the serum from a case of *S. haematobium* infection reacts with the livers of snails infected with such divergent cercariae as *S. mansoni* and *S. spindalis.* The same serum, however, failed to give any reaction with extracts derived from non-bilharzial furcocercous cercariae and also from various non-furcocercous species.

The claims of DIAMANTIS regarding the efficacy of emetine hydrochloride have been confirmed, and the author states "undoubtedly emetine hydrochloride will ultimately replace tartar emetic in the treatment of the various forms of mammalian Bilharziosis."

Rabies. In India about one person in a hundred who have undergone a complete course of treatment die of hydrophobia. Major MORISON has attempted to eliminate this failure rate by giving seven days' intravenous injections, followed by seven days' subcutaneous ones. His results are inconclusive, but 720 intravenous injections were given to 169 patients without a single accident or any alarming symptom. The general results of anti-rabic treatment are given in an appendix to the report.

E. H.

SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH. **Annual Report for the Year ended 31st December, 1923.** [WATKINS-PITCHFORD (Wilfred), Director.]—48 pp. With 2 plates. 1924. Johannesberg: Published by the South African Institute for Medical Research, P.O. Box. 1038.

Research Division. Thirty-six strains of *Meningococcus* from natives, all obtained from cerebro-spinal fluid, were investigated as to their type classification. 7 strains corresponded with Gordon's Type III, and 25 with Lister's Group E, whilst 4 were aberrant. Somewhat similar results were obtained with 23 strains of the organism from Europeans, only 1 strain corresponding with Gordon's Type I. The disappearance of this type is noteworthy, as in previous years it was one of the most prevalent. [See this *Bulletin,* Vol. 20, p. 511.]

Filter-passing organisms were isolated from cases of *Epidemic*

Influenza and *African Horse-sickness*, and sent to the Rockefeller Institure, where OLITSKY reported that the former corresponded in its morphology with the filter-passers isolated from influenza cases in America. The organism isolated from the blood serum of horses suffering from horse-sickness is stated to be hitherto undescribed, but seems to belong to the same group as *Bacterium pneumosites*, the filter-passer from cases of epidemic influenza. The inoculation of a culture of the organism, grown in Noguchi's medium, produced illness in horses, and the symptoms were not unlike those of horse-sickness. One of these horses was afterwards inoculated with 2 cc. of a known virus of horse-sickness and at once succumbed to the disease.

Taeniasis. It is recommended that if a carcase contains not more than ten bladder-worms, and these are not widely distributed, the cysticerci should be removed, and the parts not affected passed as fit for human consumption, after being kept at a temperature not higher than 10°C. for at least twelve weeks by, or under the supervision of, the Local Authority. This recommendation has been approved by the South African Parliament.

Ascariasis. The work of STEWART and others on the life-history of Ascaris has been confirmed. The presence of massive infestations is recorded, some of which give rise to intestinal obstruction. Two of these cases contained respectively 990 and 899 worms, the proportion of male to female being 3 to 7 in the first and 1 to 6 in the second.

Schistosomiasis. Certain species of the water snail *Isidora* were experimentally infected with *S. haematobium*. A cinematograph film of the life-history of the parasite has been prepared and sent to the British Empire Exhibition.

Infective Silicosis. Guineapigs have been exposed to different concentrations of various dusts and have then been given either intra-peritoneal inoculations of tubercle bacilli, or intra-tracheal inoculations of pathogenic cocci, particularly pneumococci. The results show that guineapigs that have inhaled phthisis-producing dust after either of these two inoculations may develop a lung condition comparable to that met with in miner's phthisis. Normal guineapigs inoculated intra-tracheally with pathogenic cocci either die within 48 hours or completely recover. Those that receive a similar inoculation after exposure to phthisis-producing dust either die within 48 hours or, in the majority of cases, develop a fatal, chronic, unresolving pneumonia.

Rats kept in cages underground do not live more than eighteen months, and in many cases die of pulmonary tuberculosis.

Industrial Hygiene. An investigation of the methods and results of dust-sampling in mines has now been completed, and the question of underground ventilation is being studied in a test-tunnel on the "Village Deep Mine."

Routine Division. The increase in the work of this division is shown in a table giving the returns of the past ten years, 9,091 examinations in 1914 and 35,537 in 1923. Diphtheria was fairly prevalent throughout the year, but positive findings were definitely more numerous between March and September. 318 faeces showed *Entamoeba histolytica* in 98 cases, and pathogenic bacilli of the dysentery group in 28. As in previous reports, attention is called to the fact that many typhoid cases never give a positive Widal reaction. A complement fixation test has been found to be a more reliable method of diagnosis. A complication in interpreting agglutination tests is shown in the case of typhus, which may give an agglutination with, say, *B. typhosus*

in dilutions of 1 : 100 or even 1 : 200 before it gives any agglutination with *B. proteus* × 19, and in doubtful cases no reliance can be put upon a single test.

The results of using biliated typhoid vaccine given by mouth suggest that as far as three epidemics were concerned this method is at least comparable with the ordinary T.A.B. vaccine inoculated in the usual way.

Undulant fever shows a marked increase, 686, as compared with 196 in 1922, but in many cases the diagnosis was very uncertain. Burnet's intradermal test was used in a few cases and the opinion formed that it was as reliable as the agglutination test, but not more sensitive. Tartar emetic is now used for the treatment of schistosomiasis, with very satisfactory results. Amongst surgical cases sent in for report, six appendices and one Fallopian tube contained ova of schistosoma, their presence being, apparently, the sole condition leading to the removal of these organs.

E. H.

Gold Coast. **Reports on the Medical Research Institute from January 1st, 1922, to March 31st, 1923.**—*Rep. Med. Dept. Gold Coast, January, 1922–March*, 1923. pp. 28–29. [Corson (J. F.)]; 65–77 [Ingram (A.)]

Most of the original work has been published elsewhere, and it is only necessary to refer to the routine examinations. An outbreak of relapsing fever occurred during the year, this being the first recorded in the British West African Colonies, although it has been observed by the French in the Haut Sénégal and Niger [see this *Bulletin*, Vol. 20, p. 132]. Inoculations of infected blood were made into rats and monkeys, but only the latter proved susceptible and then showed a very slight infection with no relapses. Attempts to transmit the disease by bugs and mosquitoes proved unsuccessful, and since *Ornithodorus moubata* and *O. savignyi* do not occur and *O. talaje* is very rare, it is probable that the carrier is *Pediculus humanus*. Six specimens of *Loa loa* were removed from the conjunctivae of natives at Quittah, where this parasite seems to be commoner than in the more westerly parts of the colony.

The examination of rats showed that *M. rattus*, which in 1908 was a rare species, is now the most prevalent, and *M. decumanus*, which was the commonest in 1908, is now the rarest of the three species. Out of 286 rats there were 151 *M. rattus*, 117 *Cricetomys gambianus*, and 18 *M. decumanus*. The records of fleas taken on the rats show that the prevalent flea on *C. gambianus* is not *Xenopsylla cheopis*, but *X. aequisetosus*. *X. astia** was found upon *M. decumanus* and *C. gambianus*, this being the first record of its occurrence in Africa.

The examination of samples of mosquito larvae showed that *Aëdes argenteus* (*Stegomyia fasciata*) is by far the commonest species (85·4 per cent.). The interesting suggestion is made that an increased

* This attribution has since been corrected. Mr. F. S. Cox has identified the fleas as the closely allied *Xenopsylla nubicus* Rothsch. (Evans, *Ann. Trop. Med. & Parasit.* Vol. 18. p. 413.)

percentage of this species occurs with a reduction in the rainfall, and the following table supports this view :—

The Relationship of Rainfall and the Commonest Species of Mosquito Larvae found in Samples submitted by the Sanitary Department.

Year.	Rainfall in inches.	Number of samples of mosquito larvae submitted.	Percentage occurrence of the six commonest mosquitos found in the samples submitted.					
			Aëdes argenteus.	*Culex fatigans.*	*Culex decens.*	*Culex thalassius.*	*Lutzia tigripes.*	*Anopheles costalis.*
1917	42·2	457	77·3	22·8	0·4	0·4	0·4	1·0
1918	32·37	637	78·7	17·52	5·42	1·35	0·15	5·6
1919	20·4	801	90·6	11·0	1·2	0·6	0·4	1·0
1920	15·87	700	91·4	11·1	0·3	0·4	—	0·1
1921	34·43	582	71·6	22·9	1·8	2·6	2·2	2·2
1922–23	26·53	781	85·4	9·85	1·1	2·8	0·2	1·9

A survey of the Accra District for tsetse was conducted during August and September, the results mainly corresponding with those obtained by Dr. J. J. Simpson in 1912. Apparently only two species inhabit the Accra plain, namely *G. palpalis* and *G. longipalpis* and neither is found within a radius of 7–8 miles from Accra.

E. H.

Van den Branden (F.) & Van Hoof (L.). **Rapport sur le fonctionnement du Laboratoire de Léopoldville pendant l'année 1923.**— *Ann. Soc. Belge de Méd. Trop.* 1924. Nov. Vol. 4. No. 2. pp. 231–245.

The number of cases examined for trypanosomiasis during the year was 15,332, of which 7,015 underwent gland puncture, 341 lumbar puncture, and in 2,048 the blood was examined after triple centrifuging. The number of positive cases was 186, *i.e.*, 1·2 per cent. of those examined. During the year 1923 there were 253 patients suffering from this disease in the hospital at Léopoldville. Of these, 57 died, 53 went out for external treatment, 19 left the hospital and 22 were discharged as apparently cured.

The prevalence of trypanosomiasis in the Léopoldville Territory remains fairly constant, as shown by the following figures :—

1920, 3,630	examined,	of whom	70	infected	=	2	per cent.
1922, 2,435	„	„	42	„	=1·7	„	„
1923, 2,060	„	„	43	„	=2·1	„	„

In West Léopoldville 4,018 were examined during 1923, and 28 found to be infected, *i.e.*, 0·62 per cent.

With regard to syphilis the Bordet-Wassermann reaction was employed in 1,413 cases, of which more than half were positive. The flocculation method of Sachs-Georgi was employed in 178 cases, but gave many doubtful reactions.

The following helminths were obtained from autopsies performed at the laboratory during the year :—

Metastrongylus brevivaginatus & *M. salmi* from the lungs of a native pig ; *Labiduris africana* from the intestine of a terrestrial tortoise ;

Subulura distans from the intestine of a *Cercopithecus*; *Physaloptera Vandenbrandeni*, intestine of wild cat; *Stephanurus dentatus*, lungs of pig; *Oesophagostomum columbianum*, *Bunostomum trigonocephalum*, and *Trichuris globulosa*, from intestine of a goat; *Ancylostoma caninum*, *Uncinaria stenocephala* and *Dipylidium sexcoronatum* from intestine of a dog.

Malaria. The incidence of malaria in the district is shown in the results of the examination of 512 children from 12 villages. Of these 360 showed enlargement of the spleen, 173 carried the quartan parasite, 220 the tertian, and 98 showed gametes. Similar results were obtained from the examination of other localities. *Anopheles costalis* is by far the most common mosquito.

Treatment of trypanosomiasis. The results obtained with Bayer "205" are noticed elsewhere (see *ante*, p. 135). Tryparsamide "A 63" is said to be the most active arsenical compound employed up to the present. In the case of patients who gave a normal lumbar puncture, all those treated were cured [number not stated], but the authors state that this was probably a lucky series of cases. The drug possesses the grave disadvantage of causing visual trouble in certain cases. Stovarsol has been employed in large doses given by mouth, one patient receiving 46·5 grams in 26 days without any ill effects. Its therapeutic value has not yet been sufficiently tested.

Yaws. Intravenous or intra-muscular injections of potassium and sodium tartro-bismuthate are very effective in the treatment of this disease, and no toxic effects were noticed after their use, except in two cases of syphilis. The compound, however, employed in these two cases was not neutral. Various other bismuth compounds were also used with success. Stovarsol administered by mouth is said to be as efficacious as injections of arsenobenzol.

E. H.

Diacono (H.). **Fonctionnement du laboratoire régional de Sousse (Année 1923).** *Arch. Inst. Pasteur de Tunis.* 1924. June. Vol. 13. No. 2. pp. 238–241.

Contains records of the serological examination of the registered prostitutes at Susa and Kairwan. Since the institution of this anti-syphilitic service at Susa, the number of positive reactions has diminished from 69 per cent. in July, 1921, to 17 per cent. in 1923. At Kairwan the service was only commenced on Dec. 30th, 1922, and the number of positive sero-reactions during 1923 was 62·1 per cent.

E. H.

Cilento (R. W.), McIntosh (R. D.) & Charlton (N. B.). **The Diagnosis of Bowel Diseases in Northern Australia. A Preliminary Compilation and Review.**—*Commonwealth of Australia Dept. of Health Service Publication* (*Tropical Division*) *No.* 5. 1924. 84 pp. With 4 plates and 3 figs.

This useful volume is mainly a compilation of recent advances in our knowledge of the commoner intestinal diseases liable to occur in Northern Australia. It includes chapters on uncinariasis, sprue, the dysenteric group, the bacterial fauna of the normal intestine, the pathogenic fauna of the intestine, the technique of laboratory identification

of intestinal bacilli, the agglutination reaction, and the microscopic and macroscopic examination of stools. Figures are given of the ova of the common parasitic worms of man.

E. H.

Bensted (H. T.). **Laboratory Work in Turkey, 1920-1923.**— *Jl. Roy. Army Med. Corps.* 1925. Feb. Vol. 44. No. 2. pp. 122–129.

The three main causes of disability during this period were acute diarrhoea, malaria and venereal disease, and these three disease conditions provided the main work of the laboratory. Dysentery and diarrhoea cases were examined by emulsifying a suitable portion of the faeces in saline, and inoculating directly on to MacConkey or litmus lactose media. Part was also examined microscopically, but extremely few cases of amoebic dysentery were observed and all gave histories of previous attacks in other places. In 237 successive cases of acute diarrhoea with blood and mucus, Flexner group was found 156 times ; Morgan group 39, Schmitz group 30, and Shiga group 12 times.

With regard to malaria, the majority of cases were benign tertian, but malignant occurred in the following proportions : 1921, 1·5 per cent., 1922, 9 per cent. and 1923, 8 per cent. Quartan was observed on seven occasions.

For the diagnosis of syphilis, dark ground examinations for the spirochaetes were carried out in a central laboratory. The serum from any penile sores was collected in capillary tubes and forwarded to the laboratory for examination, and, if negative, another specimen was sent 24 hours later. The results obtained justified this procedure.

Sand-fly fever was practically confined to two barracks and each late spring and summer occurred large numbers of cases of this disease.

Paratyphoid infections were far more common than typhoid owing to the high inoculation state of the Army. The routine method of diagnosing the enteric group was cultivation in pure ox-bile. Gall bladders were obtained at the slaughter-house and after being taken to the laboratory the bile was removed aseptically into sterile flasks. It was found that after sterilization the bile was not such an efficient medium. The bile, after being tested for sterility, was filled into serum flasks which were distributed to each hospital. After 5 cc. of blood from the patient had been introduced into the tube at the bed-side, the flask was re-closed with sealing wax and forwarded to the laboratory. Paratyphoid A was the most difficult to cultivate from the blood, and frequently diagnosis had to be made upon a series of agglutination tests, and recovery of the organisms from the faeces, etc. Paratyphoid B grew readily in blood culture and also paratyphoid C, but the latter infection disappeared after 1920, when the original Salonica force was replaced by fresh troops.

A curious type of jaundice occurred in the summer months, which was far more common among the officers and officers' wives than amongst the troops. The disease was always preceded by a short pyrexial period, which subsided three to seven days before the jaundice appeared. The symptoms and colour cleared up very quickly in all cases. There was a slight early leucocytosis (10,000 per cmm.) with a relative increase of 6 to 9 per cent. in the large mononuclears. Urine, faeces and blood examinations were carried out with negative results, and triple centrifugation of the blood and dark ground examination failed to show any spirochaetes.

The Weil-Felix reaction was carried out in all cases of suspected typhus and every case that gave a positive clinical picture gave a positive reaction. A culture of *B. proteus* X. 19 obtained from the Austrian Hospital at Constantinople was employed. It was rare to obtain a positive reaction before the 6th day of the disease, but by the 8th to 9th day the titre was usually 1–500.

E. H.

Geneeskundig Tijdschrift voor Nederlandsch-Indië. 1924. Vol. 64. No. 5. pp. 756–782.—**Jaarverslag van de Landskoepokinrichting en het Instituut Pasteur te Bandoeng over het jaar 1923.** [Annual Report of the Parc Vaccinogene and the Pasteur Institute at Bandoeng for the Year 1923.]

The institute was transferred from Weltevreden to Bandoeng in the beginning of 1923.

The total production of lymph amounted to 22,181 kg. (from 82 buffaloes); of 980,947 vaccinations, on an average 96·5 per cent. of those controlled were successful.

558 patients underwent antirabic treatment (excluding cases in which such afterwards proved to have been unnecessary); three patients died from lyssa, two during, one immediately after the cure.

The report further contains figures on the quantities of vaccines and sera supplied by the institute.

W. J. Bais.

Geneeskundig Tijdschrift voor Nederlandsch-Indië. 1924. Vol. 64. No. 5. pp. 783–814. **Uit het Jaarverslag van het Centraal Militair Geneeskundig Laboratorium over het jaar 1923.** [From the Annual Report of the Central Military Medical Laboratory for the Year 1923.]

From the various matters contained in this report, the following may be mentioned.

The percentages of leucocytes in blood specimens in Java were found to differ from European figures. The normal standard was determined for clinical purposes as follows: basophilic 0·5 per cent., eosinophilic 3·5 per cent., large mononuclear cells 6 per cent., lymphocytes 40 per cent., neutrophiles 50 per cent. (4 per cent. with rod shaped, 46 per cent. with segmented nucleus).

An aid to the differential diagnosis between tertian and subtertian schizonts in the thick drop may be the fact that the red blood corpuscle containing a tertian parasite remains visible, more or less, notwithstanding the haemolysis.

W. J. Bais.

MISCELLANEOUS.

Columbia University in the City of New York. **University Extension and School of Medicine in Co-operation with the Insular Government of Porto Rico. School of Tropical Medicine. Eight Months' Course for Qualified Graduates in Medicine. Given at New York City and San Juan, Porto Rico, Sept. 25, 1924, to May 30, 1925.**—7 pp.

Conjunctionally with the Government of the island of Porto Rico the Columbia University of New York has established a School of Tropical Medicine in San Juan in that island. Though Porto Rico is considered healthy, the death-rate being not more than 21 per 1,000, it has enough of tropical disease—malaria, dengue, yaws, uncinariasis, filariasis, schistosomiasis, sprue, mycosis, etc.—to make it interesting and instructive. The school course covers a term of eight months. The fundamental biological and chemical subjects will for the present be studied at the Columbia University ; the tropical medicine, surgery, and sanitation—which last will include field work in hook-worm and malaria control and field experience generally—will be carried on in the island.

A. Alcock.

Matignon (J. J.). **Nombre de coloniaux étiquetés hépatiques, à cause de leur teint, sont, avant tout, des intestinaux intoxiqués.**—*Progrès Méd.* 1924. June 28. No. 26. pp. 395–398. [3 refs.]

The author draws attention to the numerous old tropical residents who by reason of their complexion are regarded as "hépatiques." In many instances the bowel is the source of their complaint ; the apparent jaundice is not a real jaundice, for careful examination shows that the conjunctiva is spared and the urine does not react to Gmelin's test. A further proof is that they rapidly improve under treatment with Chatel-Guyon water and completely recover ; such a case is described. The abdomen is usually sensitive to pressure, there is putrefaction or fermentation of the gut contents, and often an increase in the volume of the liver, which, however, quickly yields to simple treatment. The cause of the earthy tint is red cell destruction produced by haemolysins absorbed in excess from the bowel. The liver is unable to cope with the blood destroyed, and haemoglobinaemia results.

A. G. B.

Bais (W. J.). & Verhoef (A. W.). **Het verschijnsel der iso-haemagglutinatie en de anthropologische beteekenis daarvan.** [The Phenomenon of Iso-Haemagglutination and its Anthropological Significance.]—*Nederl. Tijdschr. v. Geneesk.* 1924. Sept. 6. 2nd Half. No. 10. pp. 1212–1231. With 1 fig. [32 refs.]

The authors have examined the blood of the native and immigrant Asiatic population in a part of Eastern Sumatra (Siantar) for the

presence of agglutinable erythrocytes of the type A and B, and of the iso-agglutinins a and b. Using the groups of JANSKY, viz. :

Group I.—Neither A nor B present ; *a* and *b* present,
Group II.—Presence of A and *b*,
Group III.—Presence of B and *a*,
Group IV.—Both A and B present ; *a* and *b* absent,

they find, among 1,346 Javanese, a biochemical racial index (*i.e.*, according to the terminology of the HIRSCHFELDS, the proportion of the groups II and IV, both containing A, to the groups III and IV, both containing B) of 0·9 ; among 546 Sumatran natives a b.r.i. of 0·82 ; among 592 Chinese (from Southern China) of 0·92, and among 79 Tamils (Madrassi) of 0·55. According to this, the index is higher in the Southern Far-East than it is in India. The authors propose to extend their research to other Malayan populations.

N. H. Swellengrebel.

ARMSTRONG (J. S.) & MATHESON (H. Farquhar). **Blood Groups among Samoans.** [Memoranda.]—*Brit. Med. Jl.* 1924. Sept. 27. p. 575.

This brief note records some results of blood-group investigation of 51 presumably pure Samoans and 12 Chinese coolies. Of the Samoan bloods 7·9 per cent. fall in group I, 37·3 per cent. in group II, 13·7 per cent. in group III, and 41·1 per cent. in group IV. Of the Chinese bloods 8·3 per cent. fall in group I, 8·3 per cent. in group II, 41·6 per cent. in group III, and 41·6 per cent. in group IV. Of one other Samoan blood the corpuscles were not agglutinated by any of 16 Samoan and Chinese serums, and the serum agglutinated corpuscles of groups I and III only.

A. A.

COMBY (J.). **La médecine au Maroc.**—*Presse Méd.* 1924. Aug. 20, Sept. 3 & 17. Vol. 32. Nos. 67, 71 & 75. (Supplément.) pp. 1403–1412 & 1418 ; 1487–1496 & 1502–1503 ; 1571–1580 & 1586. With 37 figs. [2 refs.]

Those who are interested in the practice of medicine, both curative and preventive, in Morocco will find much of value in this series of papers. Starting with Tangiers, the author visited Tetuan, Ceuta and Larache in the Spanish Zone, Ouezzan, Kenitra, Rabat, Meknes, Fez, Taza, Oudjda and other towns in French Morocco, and finally Oran in Algeria. A series of photographs gives a good idea of the hospitals and schools. In nearly all these places lying-in hospitals and infant welfare centres (Goutte de lait) have been or will shortly be founded. Neosalvarsan and its variants are widely used and give the doctors great prestige ; after an injection, the native returns at once to his vocation, with no apparent harm. The author was struck by the poverty of the Moroccans, great numbers of whom are ill-clothed, ill-housed and ill-fed ; beggars abound. Their privations lessen their strength and energy, diminish their capacity for work and make them ready victims to malaria, typhoid, smallpox, dysentery, tuberculosis, and acute affections of the respiratory organs. The example of the French has already resulted in improving their methods of agriculture, and thus it is hoped to better their economic position.

A. G. B.

BIJLMER (H. J. T.) & DE ROOK (H.). **Medisch verslag van den bergtocht en slotbeschouwingen.** [Medical Report of the Mountain Expedition and Final Remarks.]—From the Medical Reports of the Scientific Central New Guinea Expedition.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1924. Vol. 64. No. 4. pp. 670–681.

Apart from the malaria and blackwater fever already described, the only illness of any importance, during the expedition, was dysentery. Sporadic cases of amoebic dysentery were met with as well as a few small epidemics of bacillary dysentery; emetine and serum injections proved to be very useful.

W. J. Bais.

SWEET (W. C.). **Notes on the Differential White Blood Cell Percentages of Residents of Brisbane, Queensland.**—*Med. J. Australia.* 1924. July 5. 11th Year. Vol. 2. No. 1. pp. 1–5. [6 refs.]

The details of this paper are not of much general interest. The percentages appear to have been calculated on 200 cells per slide, and 914 counts embracing numerous categories—healthy and otherwise—and all ages are included. The final conclusion is that the following percentages, according to J. D. THOMSON's classification (Vol. 21, p. 112), would represent the "so-called" normal for Brisbane residents:—Polymorpho-neutrophile 45 to 60, polymorph-eosinophile 4 to 13, polymorpho-basophile 0·2 to 0·5, lymphocytes 28 to 35, endothelial leucocytes 5 to 8.

A. A.

DOLBEY (Robert V.) & MOORO (A. W.). **Some Notes upon Blood Transfusion in Egypt.**—*Lancet.* 1924. Sept. 13. pp. 547–548. [6 refs.]

Dolbey and Mooro have carried out 42 transfusions during the last four years, not only for haemorrhage and shock and in surgical circumstances where shock is anticipated, but also in the treatment of anaemias and deficiency diseases. As regards its employment for the latter purposes they make some general remarks confirmative of its value in stimulating blood-forming tissues rendered torpid by the effects of hookworm and schistosome infections. In their practice, though they verify the value of blood-grouping both in transfusion and in tissue-grafting, they do not find any essential incongruity in the bloods of the various races and racial blends—Egyptian, negro, negro-arab, and levantine—represented in Egypt. They think that, as an exigency, transfusion with unclassed blood is justifiable, but the effect of a small initial dose should be watched. Possibly the dangers of incompatible blood have been exaggerated, they think, and incongruous blood though not of value as an oxygen-carrier, may have other vitalizing uses.

A. A.

FRONVILLE (G.). **Les maladies de l'appareil uro-génital chez la femme noire et leurs rapports avec sa fécondité.**—*Bull. Méd. du Katanga.* 1924. Aug. Vol. 1. No. 4. pp. 147–148.

At Elizabethville in 1921 the author made a gynaecological examination of the women of the troops and police. Of 293 he found 174, or

59 per cent., to have some affection of the genito-urinary parts—salpingo-ovaritis or abnormal ovaries 69, uterine deviations 56, gonorrhoea 21, metritis 14. Of 135 other women examined 40 were healthy and had one child a piece surviving ; 83 suffered from uro-genital affections and had 0·3 child surviving or one to 3 women. The fecundity was shown to vary with the character of the union : there was one child to two legal marriages, and one to five cohabitations (100 unions investigated).

A. G. B.

VAN LOON (F. H. Gl.). **Eene nieuwe methode van lumbaalpunctie met stuwing om den hals.** [A New Method of Lumbar Puncture with Pressure round the Neck.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1924. Vol. 64. No. 5. pp. 868–900. With 2 text figs. [27 refs.]

In a series of 37 lumbar punctures the author found the average pressure in normal position (stretched vertebral column) to be 16·8 cm. water ; by flexion of the neck the pressure rose to an average of 31·4 cm., by constriction of the neck to 37 cm. and by combined flexion and constriction to 58·1 cm. The amount of liquor which could be withdrawn was considerably larger when this technic was used. Yet the well known disagreeable after-effects of the puncture were far less pronounced in the author's cases than usually. The constriction of the veins prevents even a momentary lowering of the intracranial pressure, which in van Loon's opinion is the cause of such trouble. He recommends this method as well for diagnostical as for therapeutical purposes. In the treatment of meningitis the withdrawal of a large quantity of liquor causes a lavage of the spinal canal ; drugs or sera may be mixed with larger quantities of liquor previously withdrawn and subsequently injected up to a higher level than is usually possible.

W. J. Bais.

GOELAM. **Bepaling van het ureumgehalte van het bloed bij Europeanen en Inlanders in de tropen door middel van soja-urease.** [Determination of Blood Urea in Europeans and Natives in the Tropics by means of Soja Urease.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1924. Vol. 64. No. 5. pp. 844–867. With 1 text fig. [16 refs.]

In 25 natives the average urea content was found to 24·4 mgm. per 100 cc. blood, in 10 Europeans the average was 32·3 mgm. Goelam thinks that the higher protein content of the dietary of the European accounts for this difference, and that the difference in the residual nitrogen content of the blood in both races may certainly be explained by the urea difference.

For details concerning methods and apparatus used by the author, the original paper should be consulted.

W. J. Bais.

DALE (H. H.). **An Address on Progress and Prospects in Chemotherapy, delivered in the Section of Physiology of the British Association at Toronto.**—*Brit. Med. Jl.* 1924. Aug. 9. pp. 219–223.

We can note some commanding points in the line of flight, if we cannot abstract the spirit, of this instructive address on the progress and prospects of chemotherapy.

We are reminded that the object of chemotherapy is to discover remedies that will arrest infectious diseases not by abating their symptoms but by impeaching their specific parasites. A crude idea of such a remedy might be supplied by quinine and ipecacuanha as used respectively in the treatment of malarial fevers and amoebic dysentery. The real complexity of the idea is unravelled in this address.

The study of chemotherapy did not, however, emerge from experience of these traditional specific remedies ; it emanated from the study of immunity and from EHRLICH's grand conception of synthetic chemical products which, like antibodies, should close with and disarm specific parasites while leaving the tissues of the host untouched—a conception supported by the actual existence of certain synthetic dyes having selective affinities for particular elements of tissues and cells.

The search for chemical substances analogous to antibodies started at one point therefore from synthetic dyes, and their action on trypanosomes of standardized virulence ; thus in the course of time were produced the trypan red of EHRLICH and SHIGA and the trypan blue and the afridol of MESNIL and NICOLLE, the last of which led the advance to the more persistently powerful non-arsenical trypanocides—salts of a complex sulphonic acid, not dyes—of recent days.

Regarding the action of these substances, taken generally, certain arresting phenomena were soon observed. Although they may destroy trypanosomes in the living body they do not kill them *in vitro*—though they may so affect them *in vitro* that when afterwards they are injected into a susceptible host they fail to establish themselves there ; again, they may kill a given infection in a host of one species and not in a host of another species. Obviously there is something here more subtle than a direct selective affinity between a given chemical and a particular trypanosome protoplasm ; there must be some co-operation, immediate or delayed, on the part of the host.

Another starting-point in the search for synthetic chemicals that should strike the parasite without harming the host was furnished by the action of arsenic. Thus were produced atoxyl and salvarsan. These, again (in any *in vivo* comparable dosage) are not mortal to trypanosomes and spirochaetes *in vitro*, though the arsenoxides resulting from their partial oxidation are. This was supposed to explain their lethal action within the living body as being due to a reducing process effected by the co-operation of the host's tissues—the reducing action, in the case of salvarsan, continuing slowly and safely for a long term because of the insolubility of that drug. However this may be, it does not explain the trypanocidal action of tryparsamide—the most powerful of all these arsenic derivatives—which is now attributed to its easy penetration into the tissues of the host and its strengthening of their natural resistance.

The action [see this *Bulletin*, Vol. 21, p. 672] of LEVADITI's "bismoxyl"—a product, directly lethal to trypanosomes and spirochaetes, resulting from the incubation of certain bismuth salts with fragments or extracts of fresh animal tissue—has also been explained, by some, as due to a "reducing" process brought about by the tissue ; but since the hypothetical "bismoxyl" can be produced if bismuthous oxide, or even metallic bismuth, be used in the incubation process, a likelier explanation is that some constituent of the tissue is an essential participant in the trypanocidal action of the bismuth derivative. Then the fact that strains of trypanosomes acquiring

resistance to a trypanocide (atoxyl) in one species of host (mouse) and retaining it through indefinitely long series of that species, lose it when they are transferred to another species of host (rat) is inexplicable on any theory of direct action on the trypanosomes and loss of "chemoreceptors," but is well consistent with LEVADITI'S theory of active participation, or co-operation of the tissues.

These conceptions of a remedy destroying parasites not directly but by weakening their resistance to the natural defences of the host; or acting not in itself but in virtue of products formed either directly from itself within the host or in union with some constituent of the host's tissues; or having an affinity for particular cells or tissues of the host where it can be fixed, or can accumulate to be afterwards slowly and safely released—these conceptions, which are supported by various observations of the higher homologues of quinine and the dyes of the acridine series in the treatment of bacterial infections, must potently influence the search for more effective specific remedies.

The author quotes some of his own and DOBELL'S observations of the effect of alkaloids of ipecacuanha on the dysentery amoeba and in the treatment of amoebic dysentery as an illustration of the elusive and even illusive nature of the search for such remedies. For instance, methyl-psychotrine and certain artificial derivatives of emetine being (unlike emetine) directly lethal to the amoeba *in vitro* and (also unlike emetine) practically devoid of toxicity for man, should by the primrose path of immediate inference be placed far above emetine for the treatment of amoebic dysentery; yet when given to patients they had "no effect whatever" in cases of that disease that were promptly cured by subsequent administration of emetine. Another puzzling observation was that of an amoebic infection which in man yielded readily to treatment with emetine, but upon which, when transferred to the cat, emetine had no influence at all.

A. A.

BARNETT (J. W.). **Notes on the Local Concentration of Drugs.**— *Indian Med. Gaz.* 1924. Sept. Vol. 59. No. 9. pp. 447–450.

Except in the spleen and liver, where the blood comes in direct contact with the tissue, exchange between the outer medium and the tissues is carried on through the lymph. A drug, therefore, as administered by intravenous injection, is diluted by the lymph as well as by the blood before it reaches a particular diseased area, and there are numerous drugs that cannot—consistently with the safety of the patient—be administered in such concentration as to remain effective under this excessive dilution. By an adaptation of Bier's congestion treatment, however, this physiological dilution of potent drugs may be so limited in a (conveniently situated) diseased area as to permit an effective concentration there without risk to the patient, the drug being injected into a local artery and the local circulation at once arrested. Colloid preparations and antisera can be injected as they are, but in other cases the drug is to be dissolved in 10 cc. of a stock solution of 0·5 per cent. citrate of soda and 0·5 per cent. novocaine (if pain is anticipated) in distilled water, together with a few drops of sodium carbonate solution if the drug be acid.

The author has applied this argument to the treatment of Madura foot in patients who decline amputation, and he gives here some notes of six cases in which, respectively, copper sulphate ($\frac{1}{8}$ to $\frac{1}{2}$ gr.), colloid antimony ($\frac{1}{2}$ to 3 cc.), and simple sodium chloride solution, were injected into the posterior tibial artery and a tourniquet immediately applied to the leg above the wound of operation and retained there for half-an-hour or an hour. In one of these cases, where a succession of injections, of 15, 20, 30, 15, 15, and 15 gr. of sodium chloride was given over a term of six weeks, "a definite cure could be claimed, so far as the Madura disease was concerned." In two cases, where colloid antimony was used, the drug appeared to be retained in the blood vessels rather than diffused in the diseased tissues. In one case, where copper sulphate was used (and the foot ultimately amputated) all the tissues had become pervaded by copper. The author believes that this local congestion treatment would be specially suitable for tubercular disease of limb-bones and joints, for acute septic conditions of the extremities, and for meningeal disease—where mild congestion might be produced by a soft muffler round the neck. For the details of the author's methods of operation the original paper must be consulted.

A. A.

CAMERON (John). **The Chemical Purity of Carbon Tetrachloride.**—*China Med. Jl.* 1924. Aug. Vol. 38. No. 8. pp. 633–637. [6 refs.]

The author has carefully analysed samples of carbon tetrachloride supplied by leading pharmaceutical houses in different parts of the world, and has detected carbon disulphide in all but one of them; in one instance the proportion of carbon disulphide was approximately, and in another was actually, 1 per cent. The dictum of the B. P. Codex of 1923 is that "carbon tetrachloride for medicinal use should not contain more than 0·1 per cent of carbon disulphide." The author therefore describes here, some simple tests, qualitative and quantitative, for detection of CS_2, and also a method, which he states to be within the competence of an average Chinese dispenser, for the medicinal purification of carbon tetrachloride.

[In the *Pharmaceutical Journal* of 26th July, 1924, p. 102, the following new test is described, which is capable of eliciting a distinct reaction with as little as 5 parts of carbon disulphide per million parts of carbon tetrachloride.

An alkaline plumbite solution is made by dissolving 0·5 gm. of lead acetate in 20 cc. of water and adding 20 gm. of pure caustic potash. To 10 cc. of the carbon tetrachloride is added 3 cc. of this solution and 1 cc. of absolute alcohol. The mixture is boiled and agitated for a few minutes, and allowed to stand. A colouration, brown to bluish-black according to the amount of carbon disulphide present, is developed in a few minutes in the aqueous layer, a darkening being appreciable with as little as 5 parts per million. This test, it is suggested, may be utilized for colorimetric determination of small amounts of CS_2.

The opinion is expressed, incidentally, in this paper that the limit of 0·1 per cent. CS_2 permissible by the B. P. Codex is too high for carbon tetrachloride supplied for medicinal purposes].

A. A.

DAVIS (Nelson C.). **The Influence of Diet upon the Liver Injury produced by Carbon Tetrachloride.**—*Jl. Med. Res.* 1924. Sept. Vol. 44. No. 5. (Whole No. 194.) pp. 601–614. With 2 plates. [3 refs.]

Experiments are here tabulated showing the observed effects of carbon tetrachloride, chiefly upon the liver, of dogs under varied conditions of diet, and they show that factors of diet influence very greatly the toxicity of that drug. "Mixed diets and high protein diets—which may be considered normal for dogs—are more or less protective. High carbohydrate diets afford very striking protection against liver injury. Starvation is harmful. 'All fat' diets preceding carbon tetrachloride administration are conducive to a maximal injury of liver parenchyma."

In the experiments 19 dogs were used, and more than one experiment was performed on each, a piece of liver being excised (with described precautions against haemorrhage), and not less than a month being allowed to elapse between successive operations. The set conditions of diet were continued for 4 days before administration of tetrachloride; the dosage ranged from 0·2 to 1·0 cc., and the administration was always followed by a purge, since (although purgation diminishes the toxicity of the drug) purgation is usually employed in treatment campaigns. The operation, or necropsy, was done on the 2nd (rarely the 3rd) day after the administration of the tetrachloride.

For purposes of comparison the author gives a general description of the pathological changes (in liver, kidney, etc.) that may follow the administration of carbon tetrachloride.

A. A.

SCHULTZ (Edwin W.) & MARX (Alberta). **Studies on the Toxicity of Carbon Tetrachloride.**—*Amer. Jl. Trop. Med.* 1924. Sept. Vol. 4. No. 5. pp. 469–485. With 2 plates. [19 refs.]

Similar studies made since 1921, when carbon tetrachloride was brought into use as an anthelmintic by HALL, are discussed. In all these cases the drug was administered to animals by mouth or by stomach tube. In this series the experiments were more strictly controlled than hitherto. Dogs were used. They were anaesthetized with ether and a wedge removed from the liver. The drug was injected by syringe into the duodenum. 55 animals received doses ranging from 0·05 to 5 cc. per kilo body weight. Three dogs had the operation without the injection. Moreover, for the kidney observations five animals had one kidney removed before the drug was administered and the other examined at the autopsy.

Central necrosis of liver was always observed when the dose exceeded 1 cc. per kilo, and in 10 out of 12 cases after 1 cc.; fatty degeneration affected the livers of 8 out of 9 animals which received 0·1 cc. and some animals which received 0·05 cc. showed both these changes. It is concluded that if these observations hold for man the usual dose of 3 cc. for an adult cannot with safety be exceeded. Experiments in which magnesium sulphate was given as well as carbon tetrachloride showed that some protection is thereby given, and it has already been shown that the efficacy of the anthelmintic is not impaired [Vol. 21, p. 583].

The authors' carefully controlled observations showed that definite fatty changes are not produced in the kidneys by carbon tetrachloride.

A. G. B.

YOUNG (A. G.) & MUEHLBERGER (C. W.). **Excretion of Tryparsamide.**—*Jl. Pharm. & Experim. Therap.* 1924. June. Vol. 23. No. 5. pp. 461–464. With 1 chart. [5 refs.]

Several cases of impairment of vision have followed treatment by tryparsamide. The authors thought that variations in susceptibility to this drug might be an expression of different rates of excretion. Four normal men, whose bladders had just been emptied, received 2 grams each intravenously, and the urine was collected for 24 hours and arsenic determined. With one exception (G.K.) 88–95 per cent. was excreted within that period, and a further test confirmed the rule and the exception. It would appear that with G.K. there should be a longer interval between doses than in the other subjects. The authors conclude :—

"Certain individuals show a much slower rate of excretion. These individuals retain the arsenic over a much longer period of time and, therefore, may be more susceptible to cumulative effects of the drug. In such cases it might be advisable to increase the interval between the repeated medication beyond the usual weekly period." A. G. B.

i. COUVY (L.). **Le stovarsol dans l'angine de Vincent.**—*Bull. Soc. Path. Exot.* 1924. July 9. Vol. 17. No. 7. p. 530.

ii. ——. **Le stovarsol dans l'ulcère phagédénique.**—*Ibid.* pp. 531–532.

iii. ——. **Un cas de bronchite fétide traitée par le stovarsol.**—*Ibid.* pp. 533–534.

In these papers the author describes the good effect of stovarsol in three types of disease attributed to the association of fusiform bacilli and spirochaetes.

i. Vincent's angina and ulcero-membranous stomatitis are common at Antananarivo. About 15 cases have been treated with stovarsol : a 0·25 gm. tablet is broken up with a little water or glycerine and the paste applied to the carefully cleansed lesion 3 or 4 times daily. Concurrently the mouth is washed with a 0·25 per cent. solution of stovarsol, or with peroxide of hydrogen, one in three. Improvement is manifest in 12 hours and after 24 the lesions are clean and fusiform bacilli and spirochaetes are hard to find. Treatment has never been necessary for more than three days.

ii. The cleansed phagedaeic ulcer is packed with powdered stovarsol, a dry dressing is applied and the ulcer dressed again after 24 hours, when improvement is generally obvious. In 2 or 3 days suppuration has ceased. Change of dressing at 3 or 4 days' interval is then sufficient. Details are given of three cases in which cicatrization was complete in 6 to 15 days, and of one in which a commencing ulcer was cured with one application. Application of stovarsol is not painful. Ulcers of other origin were thus treated without success.

iii. The result of treatment of a case of fetid bronchitis with 0·5 gm. doses daily, was disappearance of smell, lessening of expectoration, general improvement and almost complete disappearance of fusiform bacilli and spirochaetes. The patient was a Hova, aged 40, whose sputa totalled over 400 cc. daily. Treatment lasted 6 days, was interrupted for 4 and resumed for 6 more, when the patient considered himself cured.

DOPTER asked for further information on the use of stovarsol in amoebiasis, especially whether this drug really prevents the formation of cysts. A. G. B.

Codet (H.). **La médecine française à Constantinople.**—*Progrès Méd.* 1924. June 28. No. 26. p. 406.

This is an appreciative recognition, which will be generally endorsed, of the successful missionary labours of Frenchmen in the fields of exotic medicine, and particularly of the educational work accomplished, in spite of discouragement, by the zealous Delamare, at the Haidar Pasha School of Medicine near Constantinople. This work has already been noticed here (Vol. 21, p. 839).

A. A.

Stones (R. Y.). **A Case of Quinine Amaurosis.**—*Kenya Med. Jl.* 1924. Sept. Vol. 1. No. 6. pp. 182–183.

The patient, aged 40, in this case had the sight of his right eye profoundly obscured from childhood by an accident. Also, he had a history of suspected syphilis and a positive blood reaction, and he smoked 15 to 20 cigarettes a day. In the twenty-one days before being seen he had had fever, for which he had received quinine—15 grains in tabloids daily for 15 days, plus 2 intramuscular injections of 6 grains each afterwards, and an unknown amount in powder and mixture. When seen (by the author) he was quite blind in both eyes; quinine was stopped and he was put on strychnine combined with vasodilators. Next day he thought he could see a white coat, and 12 days afterwards he could count fingers with the left eye and walked with confidence.

A. A.

Knowles (R.) & Das Gupta (B. M.). **On the Nature of** *Blastocystis hominis.*—*Indian Jl. Med. Res.* 1924. July. Vol. 12. No. 1. pp. 31–38. With 4 plates. [9 refs.]

Merely in the course of 1849 successive routine stool-examinations not aiming at plenipotence the authors have encountered Blastocystis in 28·8 per cent. of them, more frequently in the hot than in the cold season; and during last year they cultivated (Barret's technique) the forms of the organism that occur in faex of guineapig, rat, rhesus monkey, and man, all of which seem to be very much alike. Their observations and conclusions agree generally with those of Lynch (see this *Bulletin*, Vol. 19, p. 824, and Vol. 20, p. 454) and Aragão (this *Bulletin*, Vol. 21, p. 140). They observed multiplication by fission (binary and plural), by exogenous budding, and by endogenous spore-formation inside an ascus (best seen in cultures more than 48 hours old), and they regard Blastocystis as a genus of higher fungi closely allied to the Schizosaccharomycetes and as of quite unproved pathogenetic significance. A large number of the varied and deceptive forms assumed by the organism are figured; some of them have suggested to the authors the possible existence of gametocytes and tiny gametes.

A. A.

Elwes (F. F.). **The History of Medicine.**—*Trans. S. Indian Branch Brit. Med. Assoc.* Madras. 1924. Vol. 17. No. 2. pp. 73–84.

This elegant outline of the history of ancient medicine does not profess to be more than a compilation from easily accessible sources. The lecturer insists on the simple truth that rational medicine [like so many other things that give us moderns ever present help] is founded on the treasure and informed by the spirit bequeathed to us from Ancient Greece.

A. A.

REVIEWS AND NOTICES.

The Genera *Councilmania, Karyamoeba* and *Caudamoeba.**

In an earlier note (this *Bulletin*, Vol. 19, p. 19) the reviewer expressed it as his opinion that the amoeba named *Councilmania lafleuri* by Kofoid and Swezy (1921) was *Entamoeba coli*, and that the so-called budding process on which the genus *Councilmania* was founded was merely the result of rupture of the cyst of *E. coli* through the openings in which hernia-like buds of cytoplasm were expressed. Gunn (1922), who examined some of the cases in which Kofoid and Swezy had found *Councilmania lafleuri*, came to the conclusion that *E. coli* alone was present and that the name *C. lafleuri* was a synonym of *E. coli*. In those cases in which *C. lafleuri* was described as ingesting red blood corpuscles he concluded, as the reviewer had done, that a mixed infection of *E. coli* and *E. histolytica* had been present.

Kofoid, Swezy and Kessel (1924) and Kofoid and Swezy (1924) return to the subject of *C. lafleuri*, and replying to the reviewer's criticisms and those of Gunn, reaffirm their belief in its individuality, while Kessel (1923), Kofoid, Swezy and Kessel (1923) and Kessel (1924) claim that *Entamoeba muris* of mice and *E. decumani* of rats also belong to the same genus, as they have been found to exhibit a similar budding process. Kessel (1923) furthermore claims that rats and mice can be infected with *C. lafleuri* as well as *E. coli*, *E. histolytica*, *Endolimax nana* and *Iodamoeba bütschlii* and that in these rodents the various amoebae, particularly *C. lafleuri* and *Entamoeba coli*, retain their morphological characteristics. It is stated that *Councilmania muris* of mice as well as *C. lafleuri* of man can establish themselves in rats, so that if these statements are correct it has to be recognised that rats may harbour three distinct species of *Councilmania* as well as *Entamoeba ratti*, a new form said to resemble *E. coli*, with which these rodents may also be naturally infected. Observers may be pardoned for hesitating to accept these statements as final in view of the great difficulty associated with the differentiation of intestinal amoebae, which in the case of the human host has required years of laborious work by many competent investigators before anything like a clear understanding could be reached.

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*References (arranged chronologically).

Kofoid (Charles Atwood) & Swezy (Olive). On the Free, Encysted, and Budding Stages of *Councilmania lafleuri*, a Parasitic Amoeba of the Human Intestine — *Univ. California Public. Zool.* 1921. June. Vol. 20. No. 7. pp. 169–198. With 5 plates and 3 figs. [13 refs.]

Swezy (Olive). Mitosis in the Encysted Stages of *Endamoeba coli* (Loesch). — *Ibid.* 1922. May. Vol. 20. No. 13. pp. 313–332. With 3 plates. [16 refs.]

Gunn (Herbert). Councilmania Lafleuri not a New Amoeba.— *Jl. Parasit.* 1922. Sept. Vol. 9. No. 1. pp. 24–27. [2 refs.]

Bercovitz (Nathaniel). A Comparison of the Cysts of *Endamoeba coli* and *Councilmania lafleuri* in Congo Red.— *Univ. California Public. Zool.* 1923. Feb. Vol. 20. No. 15. pp. 365–371. [2 refs.]

Kessel (John F.). Methods of Obtaining Amoeba-free Rats for Experimental Infection with Intestinal Amoebae.— *Ibid.* 1923. Oct. Vol. 20. No. 18. pp. 401–408. [9 refs.]

——-. Experimental Infection of Rats and Mice with the Common Intestinal Amoebae of Man.— *Ibid.* 1923. Oct. Vol. 20. No. 19. pp. 409–430. With 2 plates. [21 refs.]

Kofoid (Charles A.), Swezy (Olive) & Kessel (John F.). On the Genus *Councilmania* Budding Intestinal Amoebae Parasitic in Man and Rodents.— *Ibid.* 1923. Oct. Vol. 20. No. 20. pp. 431–445. With 19 figs. [11 refs.]

Kessel (John F.). Experimental Infection of Culture Rats and Mice with the Common Intestinal Amoebae of Man.— *Proc. Soc. Experim. Biol. & Med* 1923. Nov. Vol. 21. No. 2. pp. 110–111.

The authors named above write of the genus *Councilmania* with much assurance, and by extending it to include the parasitic amoebae of rats and mice they assume that the genus is finally established though, as will be shown below, there are very strong reasons for rejecting it.

Kessel and Svensson (1924), in their survey of the human intestinal Protozoa in Pekin include *C. lafleuri* as a distinct species, though they admit that it is necessary to stain films with iron-haematoxylin as it is "impossible to make accurate differentiation between *Endamoeba coli* and *Councilmania lafleuri* when examined only in iodine-eosin stain."

The genus *Councilmania* is based entirely on the occurrence of the budding process, which Kofoid, Swezy and Kessel (1924) claim to be a definite biological phenomenon. The structure called the chromophile ridge, which is supposed to have some mysterious connexion with the formation of the pore in the cyst wall and the production of the buds, is not present in all cysts of *C. lafleuri*, while it occurs rarely, according to Kessel, in cysts of *C. decumani*, so that, whatever its real nature, it cannot be regarded as affording a feature of generic value. Kofoid, Swezy and Kessel assert that appearances of budding cannot be produced by artificial rupture of the cyst, as claimed by the reviewer. Since writing his original criticism the reviewer has obtained further evidence that artificial rupture can give rise to these appearances. It would be expected that larger cysts, especially if the cyst wall was of a soft consistency, would be more liable to rupture, and it is significant that Bercovitz (1923) has shown that the cysts of *C. lafleuri* are as a rule larger than those of *E. coli*, while their shape, which is in many cases ovoidal or elipsoidal, suggests that they are more readily deformed than the spherical ones of *E. coli*. Furthermore, Bercovitz's observation that the cyst wall in *C. lafleuri* stains with Congo red while that of *E. coli* does not, again may be taken to indicate a difference in consistency. That the consistency of the cyst wall of all the intestinal amoebae varies considerably is the experience of every one who has had to do with the staining of cysts, which in some cases are permeable to stains and in other cases quite impermeable. Though the reviewer can see no reason for changing his opinion that the budding process can be produced in this way, its existence, even if not artificial, cannot be advanced as a distinguishing generic character. The authors admit that the method of escape of *E. coli* from its cyst is not known, though it must be perfectly evident to them that

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References—*continued.*

Kofoid (Charles A.), Swezy (Olive) & Kessel (John F.). On the Distinctions between *Endamoeba coli* and *Councilmania lafleuri*.—*Univ. California Public. Zool.* 1924. January. Vol. 26. No. 3. pp. 21–39. With 24 figs. [6 refs.]

Kessel (John F.). The Distinguishing Characteristics of the Parasitic Amoebae of Culture Rats and Mice.—*Ibid.* 1924. Feb. Vol. 20. No. 23. pp. 489–544. With 6 plates and 3 figs. [39 refs.]

Kofoid (Charles A.). & Swezy (Olive). A Note on Dr. Gunn's Difficulties with Councilmania.—*Jl. Parasit.* 1924. Mar. Vol. 10. No. 3. pp. 153–157. [7 refs.]

—— & ——. The Cytology of *Endamoeba gingivalis* (Gros) Brumpt Compared with that of *E. dysenteriae*, with Special Reference to the Determination of the Amoebas in Bone Marrow in *Arthritis deformans* of Ely's Second Type.—*Univ. California Public. Zool.* 1924. June. Vol. 26., No. 9. pp. 165–198. With 5 plates and 1 fig. [40 refs.]

—— & ——. *Karyamoeba falcata*, a New Amoeba from the Human Intestinal Tract.—*Ibid.* 1924. June. Vol. 26. No. 11. pp. 221–242. With 2 plates and 2 figs. [12 refs.]

Kessel (John F.) & Svensson (Ruth). A Survey of Human Intestinal Protozoa in Peking, China.—*China Med. Jl.* 1924. Dec. Vol. 38. No. 12. pp. 961–981. [19 refs.]

Faust (Ernest Carroll). A New Type of Amoeba Parasitic in Man Observed in North China.—*Jl. Parasit.* 1923. June. Vol. 9. No. 4. pp. 221–226. With 2 plates. [5 refs.]

E. coli does emerge from its cyst when infection of a new host takes place. When the emergence is seen it will certainly be found to be associated with a pore or rupture in the cyst wall through which the entire cytoplasm of the amoeba or portions of it will escape. As the authors have not seen *E. coli* escape from its cyst they have no means of comparing the process in the two genera *Councilmania* and *Entamoeba*, so that the budding process cannot afford a means of distinguishing these genera. There would be more justification for placing *Entamoeba gingivalis* in a distinct genus because its cysts have never been seen. Kofoid and Swezy (1924) in their description of *E. gingivalis* do not adopt this course, though they are very emphatic as to their own failure and that of others to discover encysted forms. Recently a new light has been thrown on the behaviour of cysts by Sellards and Theiler (1924). They have shown that kittens can be infected with *E. histolytica* by injecting per rectum material containing cysts alone, so that there is a possibility that this amoeba may escape from its cyst in the large intestine without the necessity of leaving the host in which encystment occurred. If *E. histolytica* can do this it is equally possible for *E. coli*. The reviewer has recently examined stained preparations containing cysts of *E. histolytica* in which certain cysts revealed the budding process supposed to be characteristic of the genus *Councilmania*. It may be that this appearance in some cases at least represents the natural method of escape of *E. coli* and *E. histolytica* from their cysts.

As regards the chromophile ridge, the reviewer stated that it had probably resulted from a rupture of the cyst causing folds or creases in the cyst wall. In other cases it was suggested that it might represent chromatoid bodies. He is still convinced that in many cases this is a correct explanation, though in the later papers the authors describe as chromophile ridges a greater variety of different objects. In some cysts deeply staining bands are named chromatoidal bodies, while obviously identical structures in other cysts are called chromophile ridges. In the case of *C. decumani*, in the cysts of which chromophile ridges are said to occur rarely, the faintest streaks of stain are called chromophile ridges and homologized with deeply stained bands in other cysts. Radiating streaks of deeply staining cytoplasm converging on the pore are also included, as well as evidently damaged chromatoidal bodies. There appears to be no limit to the speculations regarding these structures, as evidenced by the descriptions accompanying some of the figures. Such remarks as "chromatoidal body exhausted in the formation of the chromophile ridge" and "fasciculate chromatoidal body, from one end of which a chromophile area passes out into the densely chromophile cytoplasm in the pore to the chromophile bud," are really without meaning and merely add to the confusion. All these appearances are readily accounted for by regarding them as irregularities in staining due to damage of the various constituents of the cyst—cytoplasm, chromatoid body and cyst wall.

For the reasons stated above, and many others into which it is not possible to enter here, the reviewer is convinced that the various amoebae placed in the genus *Councilmania* belong to the genus *Entamoeba*, for in his opinion the authors have brought forward no single feature which justifies the revolutionary step they have taken.

Not being content with introducing what appears to be an unnecessary genus *Councilmania*, Kofoid and Swezy (1924) go further, and attempt to found yet another genus *Karyamoeba*, for an amoeba of the human intestine. In this case the basis of the new genus is the nucleus, which has upon its membrane one or more crescentic masses of a deeply staining substance. During nuclear division these masses form two separate clumps which occupy the poles of the elongating nuclear membrane as deeply staining pole-caps, while at the equator of the spindle, within the nuclear membrane, about 20 chromosomes appear. The karyosome takes no part in the formation of the pole-caps and at nuclear division it is said to pass to one of the daughter nuclei. The authors make the extraordinary

mistake of comparing this type of nuclear division with that of amoebae of the genus *Vahlkampfia*, to which they suppose their new amoeba is allied. The characteristic feature of the division of the nucleus of a member of the genus *Vahlkampfia* is the formation of pole-caps from the karyosome, which divides into two parts which pass to the ends of the elongating nucleus. In the case of *Karyamoeba* the pole-caps are formed from the masses on the nuclear membrane, so that the supposition made by the authors that the nuclear division in *Karyamoeba* is of the *Vahlkampfia* type is entirely erroneous. It is well known that the nuclei of *E. histolytica* and *E. coli* sometimes possess large masses of deeply staining material on the nuclear membrane in place of the more uniformly distributed granules. Such masses are commonly seen in the nuclei of encysted forms of *E. histolytica*, and when such nuclei divide the substance, whatever its real nature, forms caps at the poles of the elongating nucleus just as they are described as doing in *Karyamoeba*. Quite recently the writer has seen amoebae similar to *K. falcata* in sections of a human liver abscess. In the division of the normal nuclei of *Entamoeba* the granules on the nuclear membrane are scattered and pass to the daughter nuclei as separate granules, and do not form compact pole-caps. When the granules happen to be aggregated into masses, then pole-caps appear, so that the pole-caps in the dividing nuclei of *Karyamoeba* lose the important significance which Kofoid and Swezy attach to them. Their presence cannot be regarded as affording a basis for a new genus. The other characters of *Karyamoeba falcata*, including the chromosome number of 20, even if correct, cannot be regarded as of more than specific value.

When it comes to a consideration of the specific characters by which the various species of *Councilmania* are distinguished from one another and from members of the genus *Entamoeba*, an array of dogmatic assertions regarding the constancy of minute characters is encountered. It is assumed that the three species of *Councilmania* always produce clear pseudopodia and have a dispersed type of karyosome, that *Entamoeba coli* always produces granular pseudopodia and has a compact karyosome and that *E. histolytica* has clear pseudopodia and has a compact karyosome. The type of movement and shape of the pseudopodia of these amoebae are compared. There appear to be various degrees of motility. *E. coli* is sluggish, *E. histolytica* is very active, while *C. lafleuri* occupies an intermediate position. The pseudopodia are described in detail. The rate of their production, the number formed at one time, the relation of their width to their length, and other details, are given with an assurance which would lead an inexperienced observer to believe that species might be distinguished by them alone. All these descriptions are based on observations made on the amoebae after they have left the body and are in an unnatural environment. The authors admit that the specimens were obtained by the administration of saline purges, the effect of which on the amoebae even when in the intestine cannot possibly be gauged. It is the reviewer's opinion that any single species may show all the variations which are supposed to characterize these several species. The only definite morphological character which can be fixed upon is the chromosome number In the case of the three species of *Councilmania* (*C. lafleuri*, *C. muris* and *C. decumani*) it is said to be 8, 6 and 4 respectively, a morphological provision for which the most optimistic could not have hoped. The number in *E. coli* and *E. histolytica* is 6, while in *Karyamoeba falcata* it is about 20. Definite assertions such as these imply that there are available very accurate methods of counting the chromosomes. It is remarkable that in a paper specially devoted to mitosis in *Entamoeba coli* Swezy (1922) could go no further than to state that the chromosome number was *probably* 6. In the case of nuclei of the type under discussion the estimation of the exact chromosome number is beset with many difficulties. There are numerous granules in the nuclei and these stain with varying degrees of intensity, so that in dividing nuclei it is purely a matter of opinion whether any one granule is

regarded as a chromosome or not. If the chromosome numbers as given by these authors are correct, then their claims regarding the distinction of species are established, but the reviewer finds it difficult to believe that the authors have succeeded in counting the chromosomes in so many forms with that degree of accuracy which is demanded if the chromosome number is to be employed for differentiating species. The fallacies associated with investigations of this kind are so numerous that he is unable to accept as final the definite statements made. In view of the fact that other competent observers have failed to distinguish the chromosomes, he prefers to adhere to his opinion that *C. lafleuri* is *E. coli*. For similar reasons he believes that *C. muris* is *E. muris* and that *C. decumani*, if not *E. muris* in the rat, is a distinct species *E. decumani*. The amoeba called *E. ratti* by KESSEL, which bears the same relation to *C. decumani* in the rat as *E. coli* does to *C. lafleuri* in man, he believes is *E. muris* or *E. decumani*. As regards *Karyamoeba falcata*, it is probably an abnormal form of *E. histolytica*, as all the three individuals harbouring it are admitted to have had an *E. histolytica* infection also. In the particular stool in which the movements of *K. falcata* were studied it is stated that other amoebae occurred. There were motionless precystic forms and cysts of *C. lafleuri*, motile forms of a small race of *E. histolytica* and active forms of *E. coli*, but no cysts or precystic forms of this amoeba. It would seem highly probable that the active forms of *E. coli* belonged to the precystic forms and cysts of *C. lafleuri* and the large *Karyamoeba falcata* to the small, probably precystic, forms of *E. histolytica*. A diagnosis of a mixed infection of typical and atypical *E. coli* and *E. histolytica* would, in the reviewer's opinion, cover all the amoebae present.

Quite apart from the question of the species of *Councilmania*, the transmission experiments described by KESSEL (1924) are worthy of attention. In the first place it is stated that the presence or absence of natural amoebic infections in rats and mice can be accurately gauged if the faeces of the animals are examined on two successive days following the administration of a purge in the shape of bread soaked in magnesium sulphate solution. Animals have been examined in this way and the results have been controlled by direct examination of the intestine post mortem. In this manner it is said that amoeba-free animals can be isolated for subsequent feeding experiments. Animals which were thus shown to be free from infection were fed with material containing cysts of all the human intestinal amoebae, with the result that when they were examined several weeks later after the administration of a purge, a certain number were found to be infected. The author claims that his experiments prove that *C. lafleuri*, *E. coli*, *E. histolytica*, *E. nana* and *I. bütschlii* can all be transferred to these animals. He gives a series of figures of the encysted forms obtained from the faeces, and these leave no room for doubt that they are actually the cysts of the amoebae in question. The interval elapsing—two weeks or more—between the time of feeding with cysts and their recovery in the faeces of the animals would seem to preclude any possibility of the cysts having remained unpassed for this length of time. The reviewer, however, feels that the statement that rats and mice can be proved to be free from amoebic infections as a result of only two examinations of the faeces requires to be very carefully controlled by other observers before it can be finally accepted. In the case of human beings, it is well known that such a test cannot possibly afford accurate information regarding the presence or absence of infection. If rats had a latent infection of *E. muris* and were then fed with cysts of *E. coli* or the supposed *C. lafleuri*, confusion would inevitably result. Natural infections of rats with amoebae of the *E. histolytica* type have also been noted, so that another fallacy is introduced. In the case of *Endolimax nana* and *Iodamoeba bütschlii* no similar amoebae of rats and mice are known. KESSEL claims that all these fallacies have been eliminated in his experiments, but the questionable methods adopted by him for distinguishing species of intestinal amoebae, and his recognition of the genus *Councilmania*, so influence his experiments

that his claims as to the possibility of infecting rats and mice with all the human intestinal amoebae require the most careful confirmation before they can be accepted with confidence.

In this place mention may be made of another generic name which is not a product of the Californian School of Protozoology. Faust (1923) gave the name *Caudamoeba sinensis* to an amoeba which he found in the human intestine in N. China. In this case the generic character is a structure called the caudostyle, which appears at the posterior end of some of the amoebae, which assume a slug-like form associated with progression in one direction. The elongate amoebae have a rounded anterior and a more tapering posterior end, where there is developed a small pointed spine, to which the name caudostyle is given. Bacteria and other débris tend to adhere to the body in the region of the caudostyle. The assumption of this particular body form is not, however, peculiar to *C. sinensis*. It occurs quite commonly in free living amoebae when they move in this manner, and it has been noted in several parasitic forms, amongst which is the common amoeba of the cockroach. Undoubted *E. histolytica*, particularly in artificial culture, not infrequently assume the elongate body form for progression in one direction. Bacteria and other débris in these cases adhere to the posterior end of the body, as in *Caudamoeba sinensis*. It does not seem probable that the caudostyle is anything more than a spike of tough ectoplasm which has formed as a result of the continued progression in one direction. It seems to the reviewer that the evidence available is insufficient to justify the separation of *Caudamoeba sinensis* from *Entamoeba histolytica*.

C. M. Wenyon.

Mense (Carl). **Handbuch der Tropenkrankheiten. 3te Auflage. Band 3. Malaria und Schwarzwasserfieber** (von Prof. Dr. Hans Ziemann).—pp. xiv+592. With 7 plates & 152 text figs. 1924. Leipzig: Verlag von Johann Ambrosius Barth. [Price G.M. 36 (unbound), 40 (bound).]

Malaria, pp. 1–480.

When a consideration of malaria covers over 480 large pages, with many hundreds of references, with six admirable coloured plates, and 139 figures, such consideration will cover most of the ground. The print used varies with the estimated importance of the subject, and with this one has little right to disagree. It is manifestly impossible adequately to deal here with such a volume, the more so that the findings, opinions and conclusions of others than the author have deliberately such a large part in it. The work will be widely read.

Its very composite character leads, however, to difficulties. There are, for instance (p. 132), a number of charts illustrating the monthly incidence of new cases and of relapses of malaria in Italy, and one of the same kind (p. 137) dealing with Ziemann's own work in the Cameroons. The former, one gathers, are based on clinical diagnosis; the latter presents uncertainties. Firstly, the line purporting to trace new infections is clearly the total, and which of the others represents new infections and which relapses it is impossible to say. It appears, moreover (p. 307), that Ziemann characterizes as a relapse any case showing gametocytes in the cutaneous blood. Now Warrington Yorke and Macfie (this *Bulletin*, p. 51), in a paper which Ziemann mentions three times, twice incorrectly, writ[illegible] of primary mosquito infections in general paralytics, "The first parasite[illegible] to appear in the peripheral blood were almost invariably trophozoites, but in all cases gametocytes made their appearance two or three days later." This single observation renders meaningless many paragraphs of the book.

Again, the work of CHRISTOPHERS, SCHUFFNER, MAXCY, DARLING, and others already requires the rewriting of the chapter on the spleen index, in which matter the work in India scarcely receives the mention which is its due; and recent deliberate infections of general paralytics with malaria have thrown into relief, and necessitate fuller consideration of, natural immunity in, and natural cure of, malaria.

It is concluded that available evidence suggests an indirect effect of quinine on malaria parasites. Yet it is again stated most emphatically, with no evidence or references cited, first, that quinine acts best on the free merozoits or small schizonts, and, second, that the quinine content is highest in the blood two or three hours after ingestion. It is accordingly concluded that the drug should be given at that interval before the expected rigor. But if quinine act indirectly, as for instance through metabolites, the amount of quinine momentarily circulating can have no necessary relationship to its momentary curative power; possibly the reverse.

Consideration of the vexed question of intramuscular injection of quinine leaves dissatisfaction, since there is no adequate reference to the mass of evidence that, on occasions at least, the amount of quinine imprisoned and useless in the muscles may be great, and must render that route one of grave uncertainty in any particular instance. Quinine resistance, again, is accepted as a fact, without note of the growing evidence that it should be termed non-absorption, wilful or otherwise.

The references, although so numerous, may be aggravatingly wanting, as, for example, in the nomenclature of the parasites. Another instance of their inaccuracy, which a very casual search reveals, is the discovery that Deli, which calls up Sumatra, should read Delhi, which gives one a mental shift of many hundreds of miles.

Clayton Lane.

Blackwater Fever, pp. 481–592.

After perusal of this handsome volume the reviewer is filled with amazement when he reflects that it is only about six years since the appearance of the equally handsome second edition. That the demand, in the present hard times, for expensive books of this kind is sufficiently great to warrant the production of a new edition so shortly after the previous one is striking testimony to the general interest in tropical medicine. Certainly the necessity for the new edition cannot have arisen from any rapid growth of knowledge concerning the etiology, pathology or mechanism of blackwater fever, as anyone who takes the trouble to glance through the summaries of papers relating to this disease can readily convince himself.

No less than 112 pages are devoted to blackwater fever and consequently it is not surprising to find that the subject is treated very fully. Of its kind the volume impresses one most favourably, it is beautifully printed and contains a vast mass of information. Possibly from the point of view of the ordinary student or practitioner, it contains too much, although, as the author states in his preface, matter of a purely scientific or casuistical nature is printed in small type. On the other hand, however, the book will doubtless prove of value to those specially interested in blackwater fever in so far as it gives a general idea of the scope and nature of the observations recorded by the numerous investigators who have devoted themselves to a study of this perplexing disease. Criticism is unnecessary, but it might perhaps be noted that the graphs depicted in Figs. 141 and 142, each of which occupies almost an extra page, are after STEPHENS—a fact which is omitted both in this and in the previous edition. The book is a good one of its kind, and the question whether, in the absence of any appreciable advance in knowledge, the frequent appearance of new editions is justifiable, is obviously one which concerns the publishers.

Warrington Yorke.

BELL (Walter George) [F.S.A., F.R.A.S.]. **The Great Plague in London in 1665.**—pp. xii+374. With 30 Illustrations comprising Contemporary Prints, Plans and Drawings. 1924. London: John Lane. The Bodley Head Ltd. New York: Dodd, Mead & Co. [Price 25s. net.].

Those of us who are not professors of epidemiology have probably taken our impressions of the Great Plague of London from the pages of DEFOE'S famous *Journal*. We know quite well that that immortal work is not formal history; but we know that its author must have heard a great deal about the calamity when men remembered it and would have been ready to talk about it, and might even, as a small boy, have himself been affected by it; and we know also that he was a man of extraordinary gifts of comprehension and discernment, and an honest godfearing man who three times suffered in the pillory rather than bring trouble upon his printers; moreover, we know that "history" is a term by no means "purged and snuffed from ambiguity." So that what DEFOE worked out by the light of nature and in the fear of God many good men have been content these two hundred years to take for true.

The present work, composed in the light of recent knowledge of plague causation and by modern methods of research, is something very different from the old-fashioned tale of DEFOE. Based on contemporary documents, and effectively illustrated by portraits and reproductions of other contemporary pictorial matter, it is a full and authoritative account of particular events of the great epidemic as it took its course and of a diversity of individual characters, great and small, as they played their part upon its tragic stage. It is thus furnished with an official precision and a wealth of historic personal interest that is lacking in its great original; but, above all this, it places the Great Plague of London in its proper sanitary perspective, and thus may still afford a salutary lesson to a generation rather apt in its superior wisdom to forget the past.

To the world of DEFOE hygiene was unknown; an epidemic was a fierce, inscrutable disaster presaged by signs and wonders in the heavens, and plague a mysterious malady that might perchance be averted by an amulet. To DEFOE himself the Great Plague was indeed a judgment, but acting by means of an infection brought from Holland; that any determinative causation existed in the then normal environment of the people of London was in those days a conception outside the bounds of possible knowledge. It is a leading feature of the present book that it explains to the general reader how in 1665 all the causes of a plague epidemic were in rampant existence in London itself. The author depicts the horrible insanitary condition of the London of that time—the awful slums, and the wooden houses surrounded by every sort of accumulated dirt and defilement attractive to rats (native rats of the *rattus* or "black" species)—and then by an appeal to history he shows that mortality from plague, notwithstanding every inducement to conceal it, had been a regular item of the city's records from the beginning of the 17th century—a legacy from the Middle Ages. Even "in 1499 a severe plague in London caused Henry VII. to retire to Calais," and in 1563 thousands died of the infection. There was an epidemic in 1593, one much greater in 1603, one much greater still (41,313 deaths) in 1625. In short, the city records, as we are here told, were clear of mortality from plague in only four doubtful years between 1603 and 1665. Moreover, in spite of the Great Fire of 1666, which is popularly supposed to have utterly consumed the infection, plague still held its footing in London until 1679. Thus the reader is led to understand the Great Plague of London not as a sudden infection from abroad suddenly ended by a cleansing conflagration, but as the worst-known epidemic exacerbation of a long-persistent endemic disease; and is led to appraise the Great Fire of London as not so much a direct and complete specific disinfection as a sweeping clearance of an insanitary site and focus, for subsequent sanitary reconstruction and security. And this is an en-

couraging lesson for the practical sanitarian, since it illustrates—as does also the history of malaria in England—how, even in entire ignorance of its recondite scientific causation, a specific endemic disease can be extinguished by a straightforward sanitary advance on broad lines.

Among other particulars of medical interest the author tells us, mainly on the authority of Dr. HODGES, that very disastrous consequences resulted from a widespread belief that venereal disease was protective against plague—a particular iniquity not mentioned by DEFOE. On the other hand, DEFOE states that a prodigious number of rats and mice was deliberately destroyed by poison (a statement that in those days could never have occurred to the most finished exponent of artistic verisimilitude in fiction), whereas the present author, although he quotes an absentee official as instructing his clerk to "take all course you can agaynst ratts," says that no attention appears to have been paid to rats, unless they were included with the dogs and cats and "other vermin" officially ordered to be killed.

It is a pity that the author insists so much that DEFOE's honest story should suffer comparison with his own opulent monograph. Outside the eternal realms of poetry and philosophy and things of the spirit, there are for written books no standards of comparison common to the 18th and 20th centuries, even if standards of historic verity had scientific precision. Judged by the standard here set, DEFOE must be allowed to have given an accurate account of the Great Plague considered merely as an isolated epidemic phenomenon, and a truthful representation of its multiplied sorrows of hell and of its divers other concurrent and consequent events and reactive effects—although (unlike most of us) he appears to have had some unduly favourable misconceptions of the literal efficacy of official orders. So that those who delight in him for his manner—his honest piety and grave simplicity, his homely speech, his philosophic tolerance for the weakness of affrighted human nature, his tedious brief excursions with the three men of Wapping and the poor waterman of Blackwall—may still trust him "in the general" for his matter, and therefore will not suffer him to be dealt with as an imaginative writer of historic fiction.

A. Alcock.

WAR OFFICE. **Memoranda on Medical Diseases in Tropical and Subtropical Areas.** (Revised with additions by Bt. Lt.-Col. W. P. MACARTHUR, R.A.M.C.) 4th Edition. 1924. 275 pp. With 131 figs. 1924. London: H.M. Stationery Office. [Price 2s. 6d. net. Postage extra.]*

For concentrated worth, as well as for artistic and technical proportion and for modesty of price, this little book is a wonder. In 275 small pages of good paper and clear type it supplies an excellent account—clear, concise, critical, and well supplemented by charts and figures—of the several diseases of lower latitudes, arranged in alphabetical order, each disease being harmoniously treated in all its major aspects; it includes also, under the heading of Arthropod Pests, a succinct and well-illustrated treatise on the ancillary subject of medical entomology; and all for half-a-crown. With all its concentration it has none of the vile crudity of a cram-book: the account of each disease represents the well-digested product of a balanced diet rich in vitamins. Though it could undoubtedly be used as a text-book, it is essentially a book for the practitioner and the medical officer, as is finely and diversely exemplified in the chapter on the differential diagnosis of fevers, in the admirable chapters on malaria and amoebic dysentery, and in the paragraphs on vaccination and vaccine lymph

* Purchasable direct from H.M. Stationery Office, Adastral House, Kingsway, London W.C. 2; 28, Abingdon St., London, S.W. 1; York St., Manchester; 1, St. Andrew's Crescent, Cardiff; or 120, George St., Edinburgh; or through any Bookseller.

in the tropics. There are, it would seem, certain omissions which, since one is loath to assume that they are unwitting, cause surprise when the varied complexion of the civil and military services of the Empire is considered. The most obvious of these omissions are, in alphabetical order, epidemic dropsy, hill-diarrhoea, leprosy, sprue, yaws, and yellow fever.

It is a cheering confirmation of the old adage that "good wine needs no bush" to find that this good book has reached a fourth (revised) edition in the course of six years without the meed of any melodious advertisement. This present revision brings it quite up to date besides imparting a few touches of academic polish.

A. Alcock.

MALARIA (CORRESPONDENCE).

DARLING (Samuel T.). **The Spleen Index in Malaria.**—*Southern Med. Jl.* 1924. Aug. Vol. 17. No. 8. pp. 590–595. Discussion pp. 595–596.

Dr. Darling writes from Leesburg, Georgia, (February 12, 1925) as follows :—

"I should like to correct certain errors which have been made in a recent issue of the *Bulletin*, Vol. 22, No. 1, p. 41.

"On page 41 the reviewer has attributed to Dr. BARBER authorship of the article on 'The Spleen Index in Malaria' published in the *Southern Medical Journal*, August 1924. This is an error. The article is a paper written by me and read before the National Malaria Committee, which met conjointly with the Southern Medical Association, November 12–15, 1923, and my name appears under the title of the article.

"Because of the opinion expressed in the article that methods of detecting the degrees of splenic enlargement finer than those used in the Orient would probably have to be used in the Southern States, the reviewer declares that CHRISTOPHERS' work reviewed in this *Bulletin*, August 1924, Vol. 21, No. 8, had evidently not reached America, but he has failed to note on page 590 of the *Southern Medical Journal* that my paper was read November 1923, manifestly at too early a date for me to have seen CHRISTOPHERS' papers published in April the following year. CHRISTOPHERS has given us a method for measuring the enlarged spleens so often encountered in the Orient. Here in the Southern States where there is less under-feeding and less hyperendemicity, spleens of the largest sizes are very rarely encountered. Because of these facts I suggested on page 592 of the article that spleens of the smaller sizes, particularly those palpable on deep inspiration, would also have to be detected and recorded, if the spleen is to be used here to measure malaria. These small spleens are pathological and they are evidences of malaria. This is my point, as may be gathered from the text on page 592 and from the classification of the sizes of spleens used in measuring malaria at the Leesburg Station. It is quite different from anything which appears in CHRISTOPHERS' articles, but it is a point which the reviewer seems to have overlooked."

We are glad to publish Dr. Darling's letter and regret the errors to which he draws attention.—Ed.